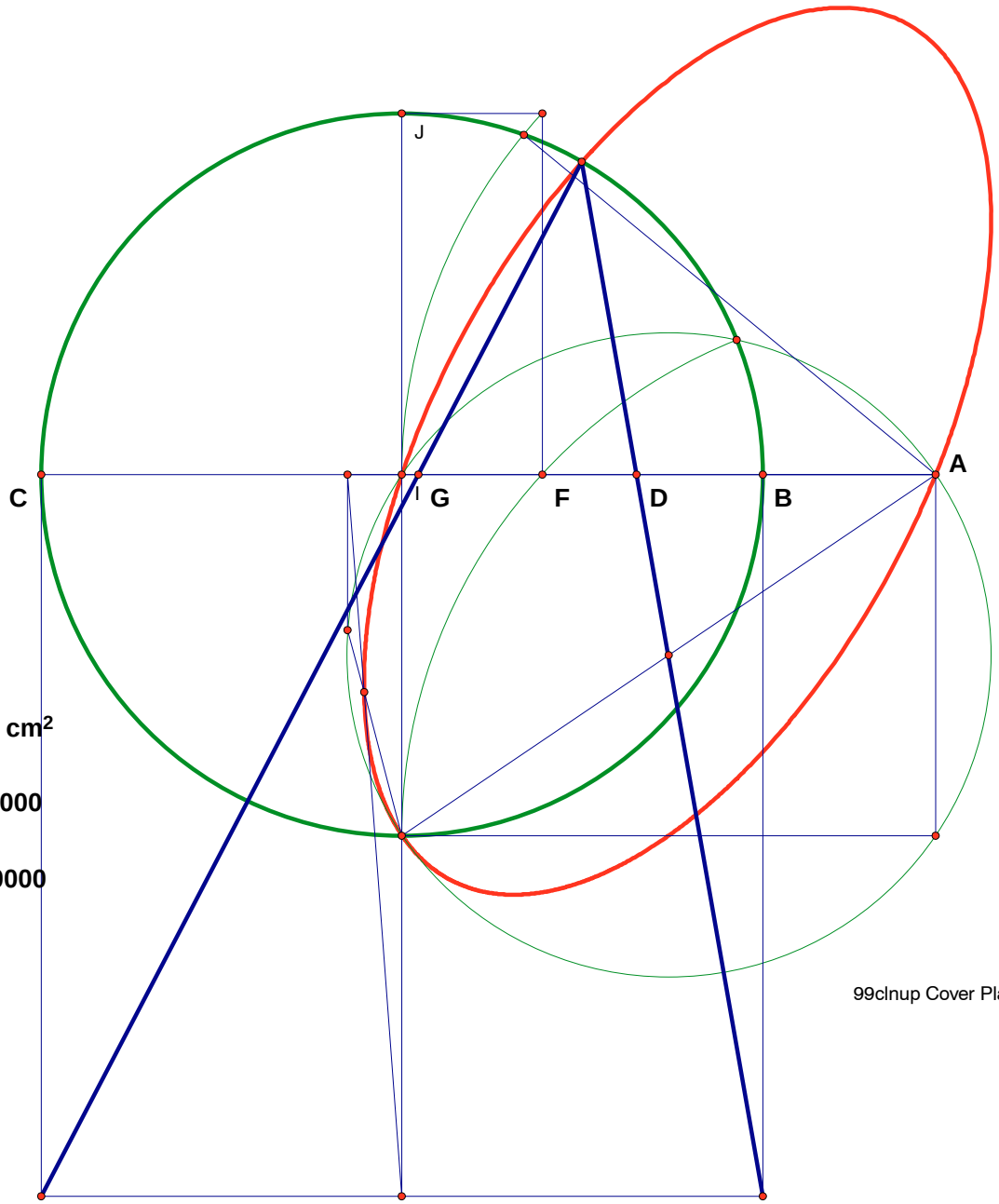
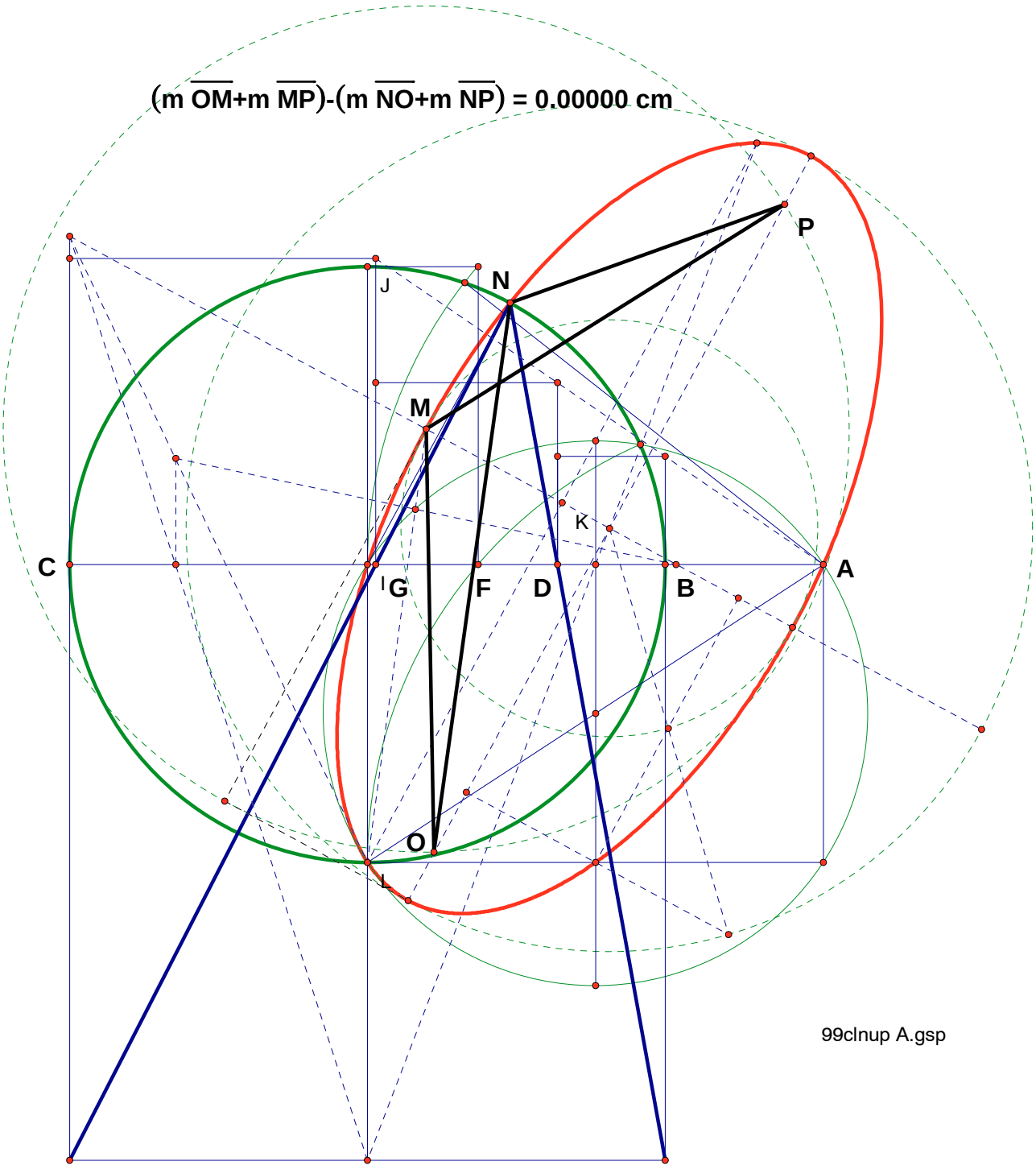


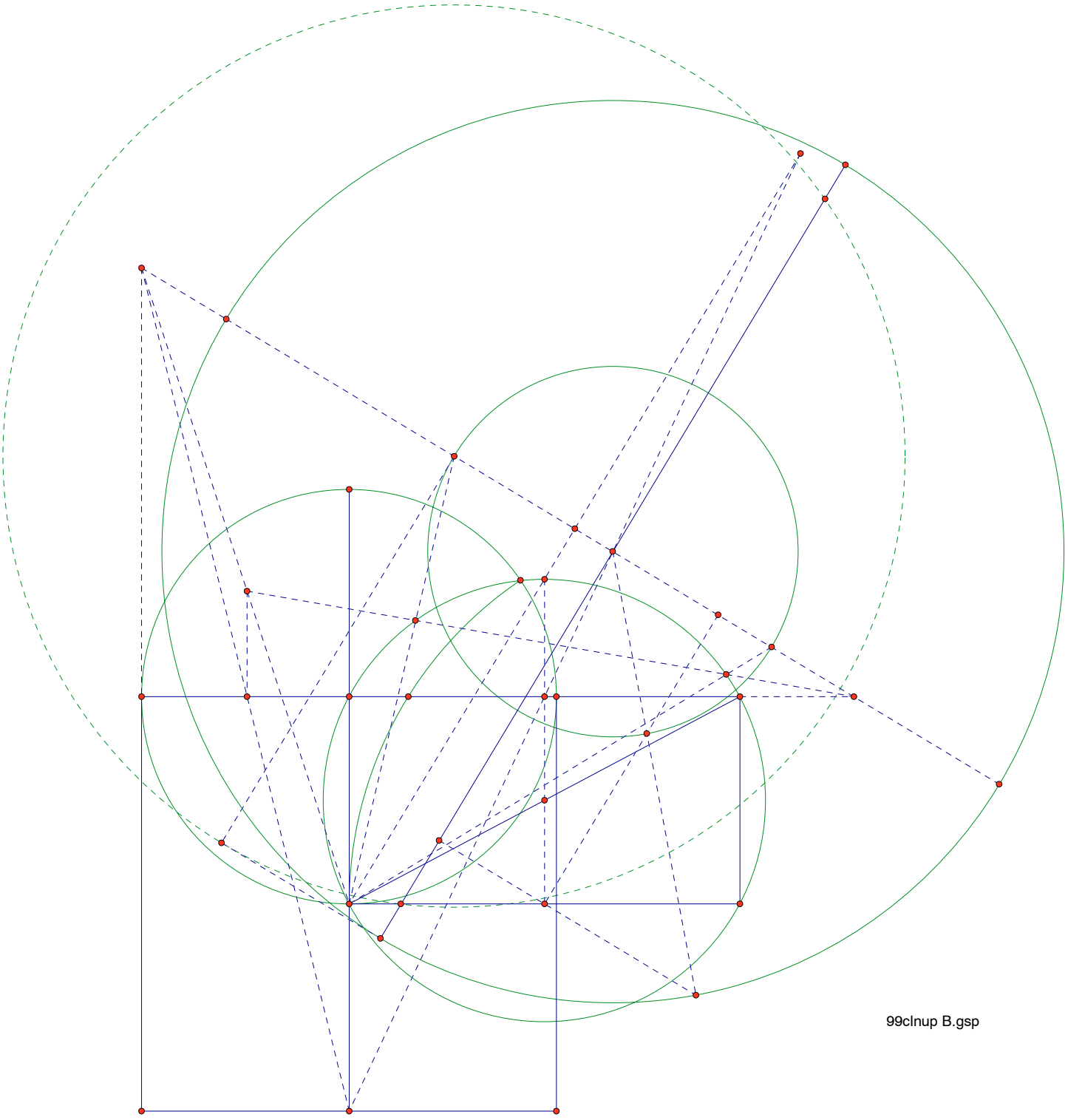
$AB \cdot AC - AF^2 = 0.00000\ cm^2$

$(AB^2 \cdot AC)^{\frac{1}{3}} - AD = 0.00000$

$(AB \cdot AC^2)^{\frac{1}{3}} - AG = 0.00000$

99clnup Cover Plate.gsp


(m OM+m MP)-(m NO+m NP) = 0.00000 cm
P
N
J
M
K
C
I
G
F
D
B
A
O
L
99clnup A.gsp


99clnup B.gsp

m $\overline{OM}$ = 8.53290 cm

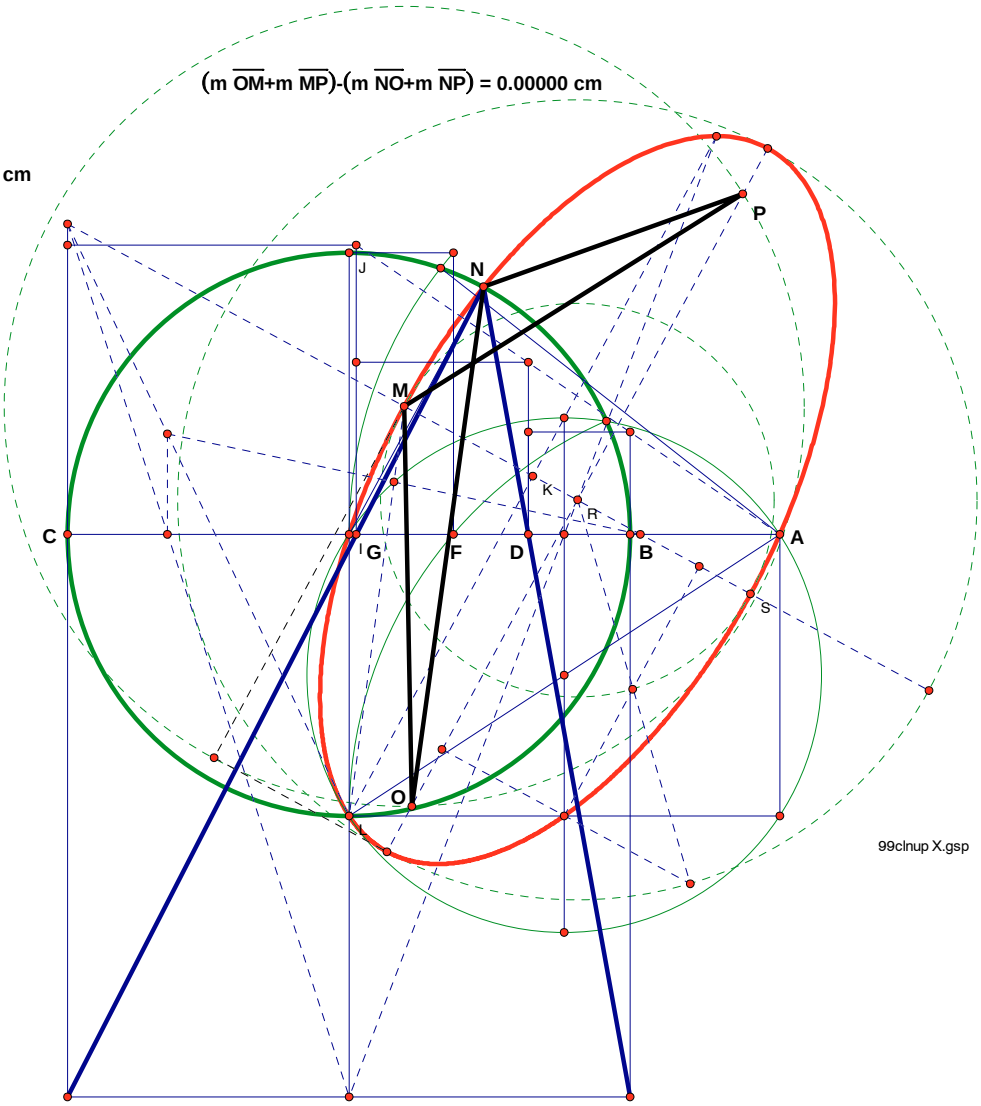
m $\overline{MP}$ = 8.53290 cm

m $\overline{NO}$ = 11.18126 cm

m $\overline{NP}$ = 5.88454 cm

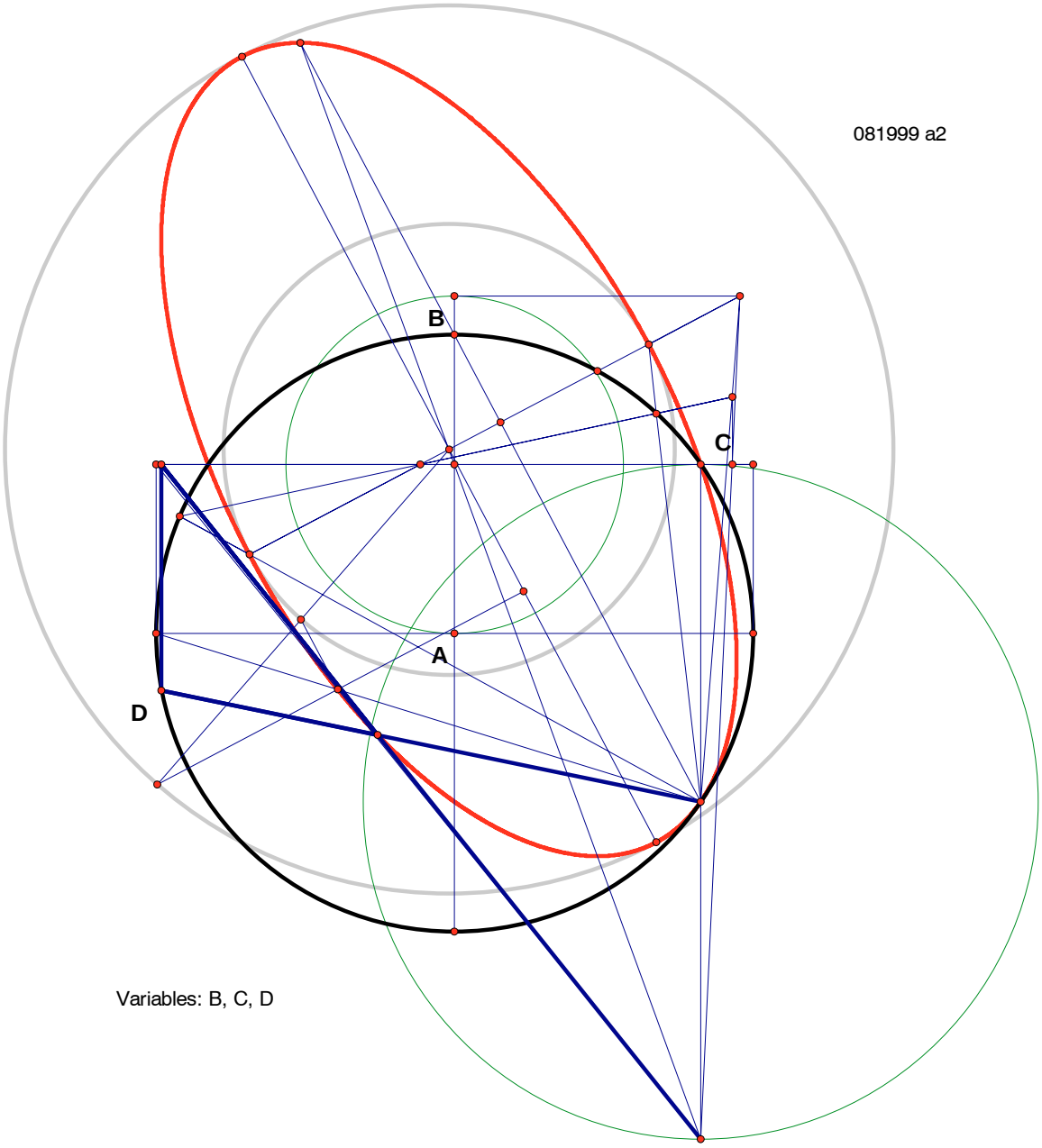
RS = 4.20290 cm

$(m\ \overline{OM}+m\ \overline{MP})-(m\ \overline{NO}+m\ \overline{NP})$ = 0.00000 cm

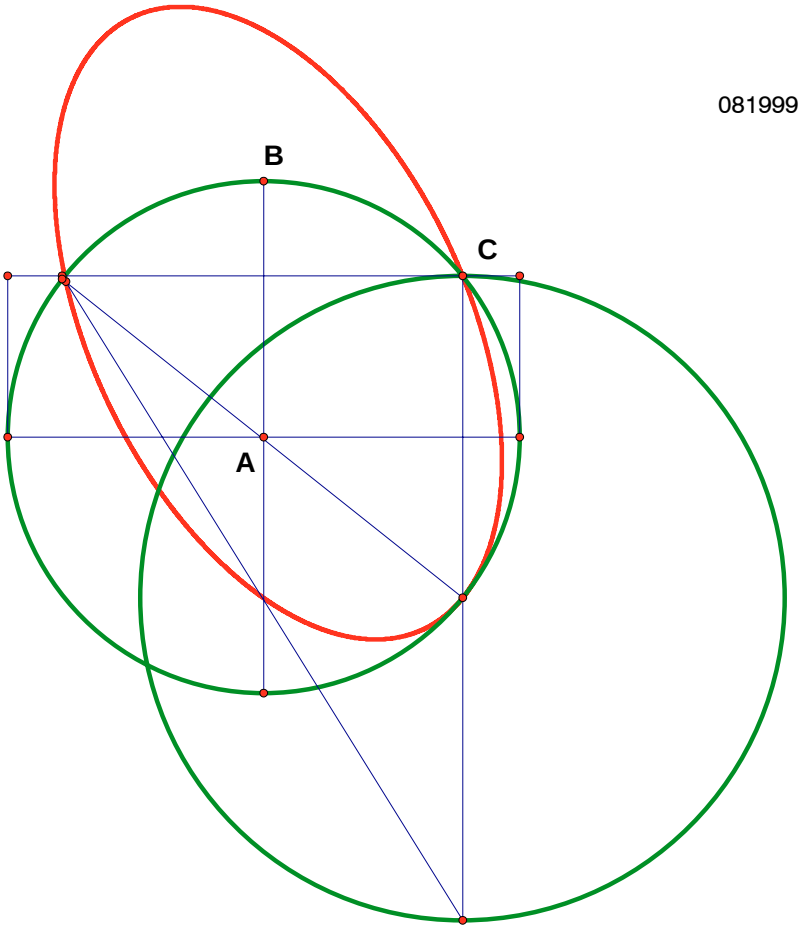


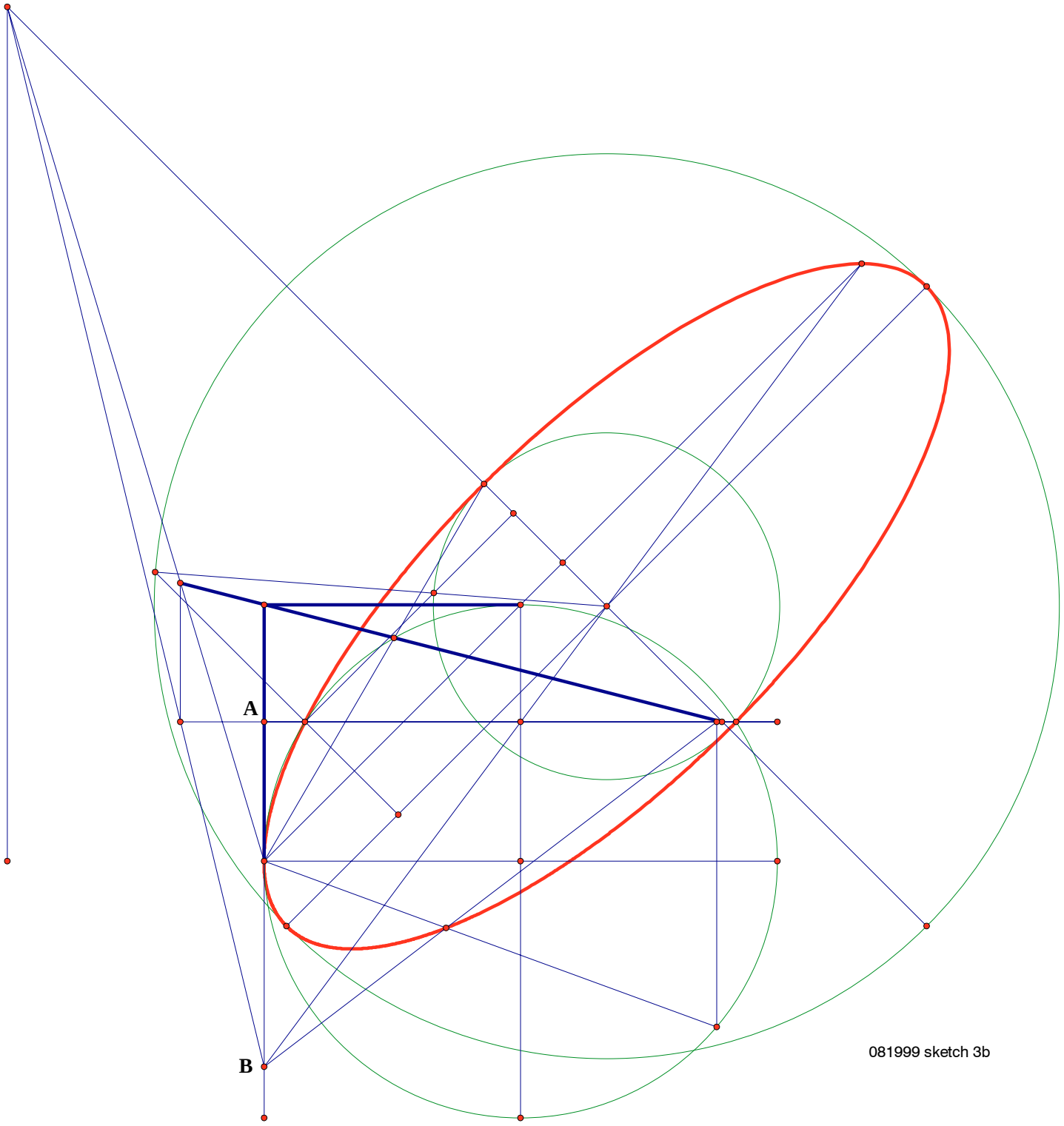
99clnup X.gsp

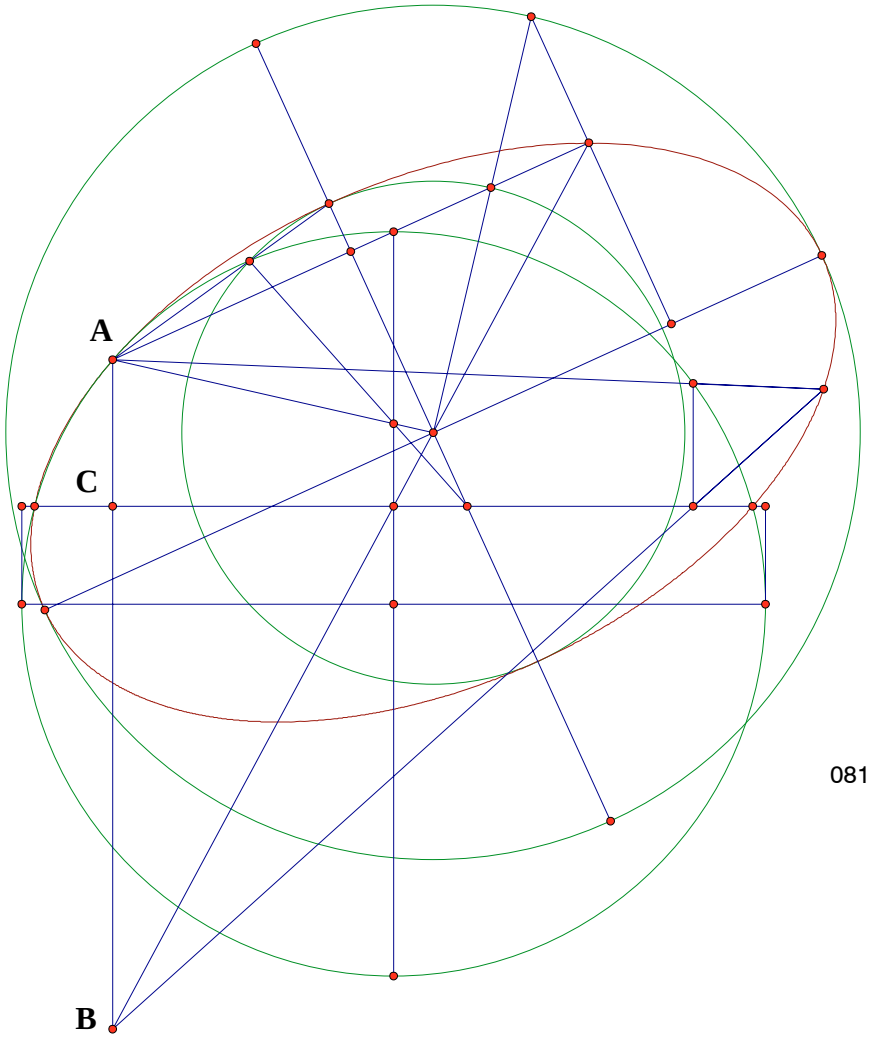
Animate Point



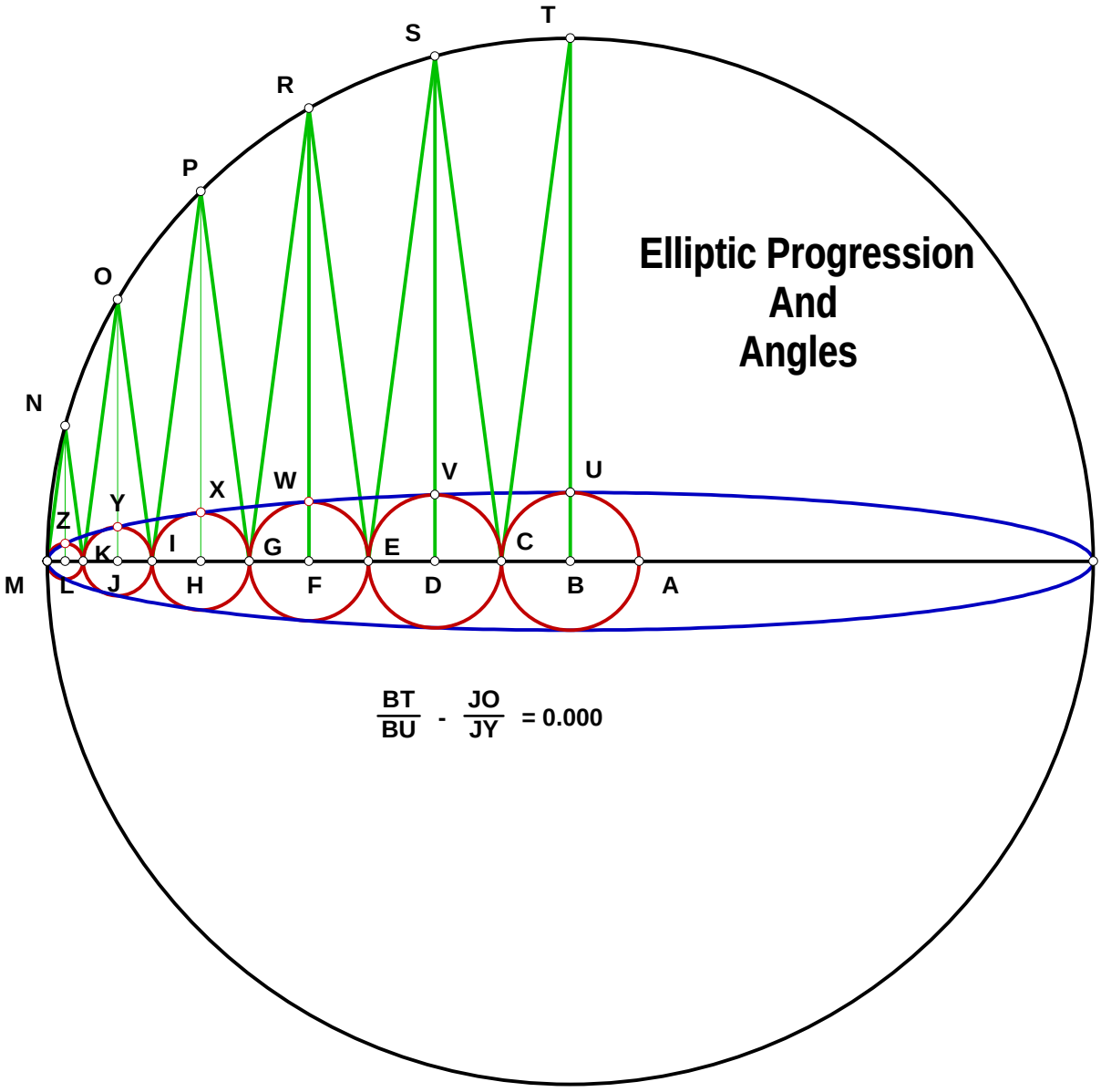
Variables: B, C, D


081999 a1
B
C
A


A
B
081999 sketch 3b



081999b


T
S
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I
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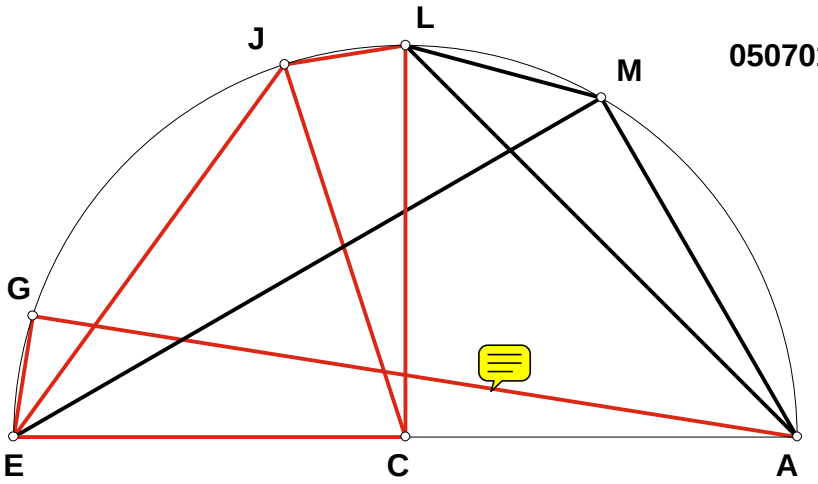
F
E
D
C
B
A
Z
Y
X
W
V
U
Elliptic Progression
And
Angles
BT/BU - JO/JY = 0.000



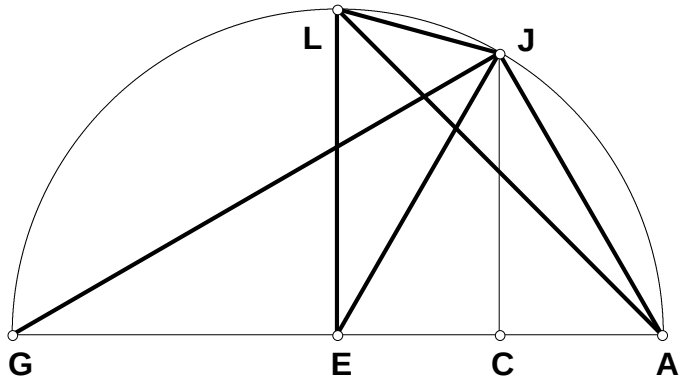
050701 Segment Map

$$EM := \frac{1}{2}\cdot\sqrt{3} \qquad AL := \frac{1}{2}\cdot\sqrt{2} \qquad JL := \frac{1}{4}\cdot\sqrt{8 - 2\cdot\sqrt{10 + 2\cdot\sqrt{5}}} \qquad LM := \frac{1}{4}\cdot\sqrt{6} - \frac{1}{4}\cdot\sqrt{2}$$

$$AM := \frac{1}{2} \qquad EJ := \frac{1}{4}\cdot\sqrt{10 - 2\cdot\sqrt{5}}$$

$$AG := \frac{1}{4}\cdot\sqrt{8 + 2\cdot\sqrt{10 + 2\cdot\sqrt{5}}}$$

Outtake Four: Some Names 0507014



$AG := 1 \quad AE := \frac{AG}{2} \quad AC := \frac{AE}{2}$

$CG := AG - AC \quad CJ := \sqrt{AC \cdot CG}$

$EL := AE \quad CE := AC$

$JL := \sqrt{EL^2 - 2 \cdot EL \cdot CJ + CJ^2 + CE^2}$

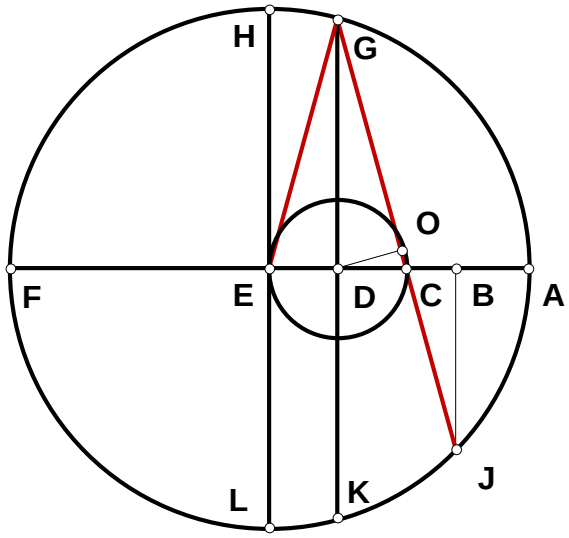
$AJ := \sqrt{AC^2 + CJ^2} \quad GJ := \sqrt{CG^2 + CJ^2}$

$AL := \sqrt{AE^2 + EL^2}$

$AE := \frac{1}{2} \quad AC := \frac{1}{4} \quad CG := 1 - \frac{1}{4} \quad CJ := \frac{1}{4} \cdot \sqrt{3} \quad JL := \frac{1}{4} \cdot \sqrt{6} - \frac{1}{4} \cdot \sqrt{2}$

$AJ := \frac{1}{2} \quad GJ := \frac{1}{2} \cdot \sqrt{3}_{*} \quad AL := \frac{1}{2} \cdot \sqrt{2}$

Elliptic Progression Outtake One 0507011



A method of trisection Algebraically.

$N := M$

$N \geq 4 = 1$ $\quad AF := 6$ $\quad AE := \frac{AF}{2}$

$DE := \frac{AF}{N}$ $\quad AD := AE - DE$ $\quad DF := AF - AD$

$DG := \sqrt{AD \cdot DF}$ $\quad CD := DE$ $\quad EG := AE$

$CO := \frac{CD^2}{EG}$ $\quad CG := EG$ $\quad CJ := CG - 4 \cdot CO$

$BC := \frac{CD \cdot CJ}{CG}$ $\quad AB := AE - (2 \cdot DE + BC)$

$BJ := \frac{DG \cdot BC}{CD}$ $\quad BD := BC + CD$

$JK := \sqrt{DG^2 - 2 \cdot DG \cdot BJ + BJ^2 + BD^2}$ $\quad \frac{JK}{2 \cdot DE} = 1$ **Some Algebraic Names,**

Part of this demonstration may be something of a reductio ad absurdum, if one supposed that CJ were not true. I suppose I need a plate to demonstrate it.

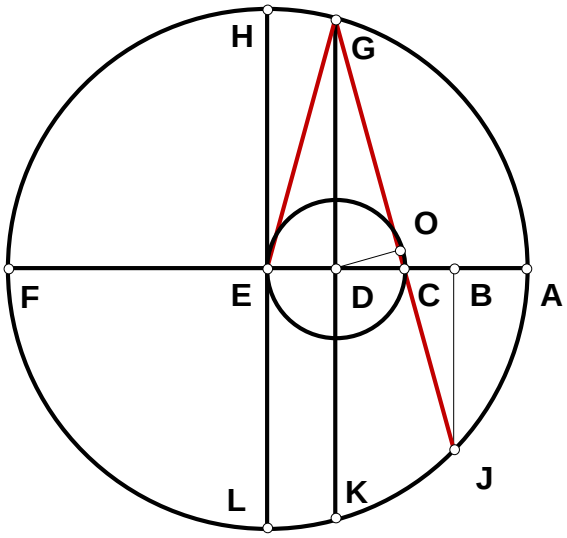
$AF \cdot \frac{(N-2)}{2 \cdot N} - AD = 0$ $\quad AF \cdot \frac{(N+2)}{2 \cdot N} - DF = 0$ $\quad AF \cdot \frac{\sqrt{(N-2) \cdot (N+2)}}{2 \cdot N} - DG = 0$

$\frac{2\ AF}{N^2} - CO = 0$ $\quad AF \cdot \frac{(N-4) \cdot (N+4)}{2 \cdot N^2} - CJ = 0$ $\quad AF \cdot \frac{(N-4) \cdot (N+4)}{N^3} - BC = 0$

$AF \cdot \frac{(N+2) \cdot (N-4)^2}{2 \cdot N^3} - AB = 0$ **One of the meanings of trisection is solving for the following equation when given AF and AB.**

$$\frac{AF}{AB} - \frac{2 \cdot N^3}{(N+2) \cdot (N-4)^2} = 0$$

$AF \cdot \frac{(N-4) \cdot (N+4) \cdot \sqrt{(N-2) \cdot (N+2)}}{2 \cdot N^3} - BJ = 0$ $\quad AF \cdot \frac{2 \cdot (N^2 - 8)}{N^3} - BD = 0$ $\quad \frac{2 \cdot AF}{N} - JK = 0$



$$\frac{2\cdot M^3}{(M+2)\cdot(M-4)^2} - \frac{AF}{AB} = 0 \qquad \frac{AF}{AB} = 6$$

$$\frac{2\cdot M^3}{(M+2)\cdot(M-4)^2} - 6 = 0$$

$$\frac{2\cdot M^3}{(M+2)\cdot(M-4)^2} = 6$$

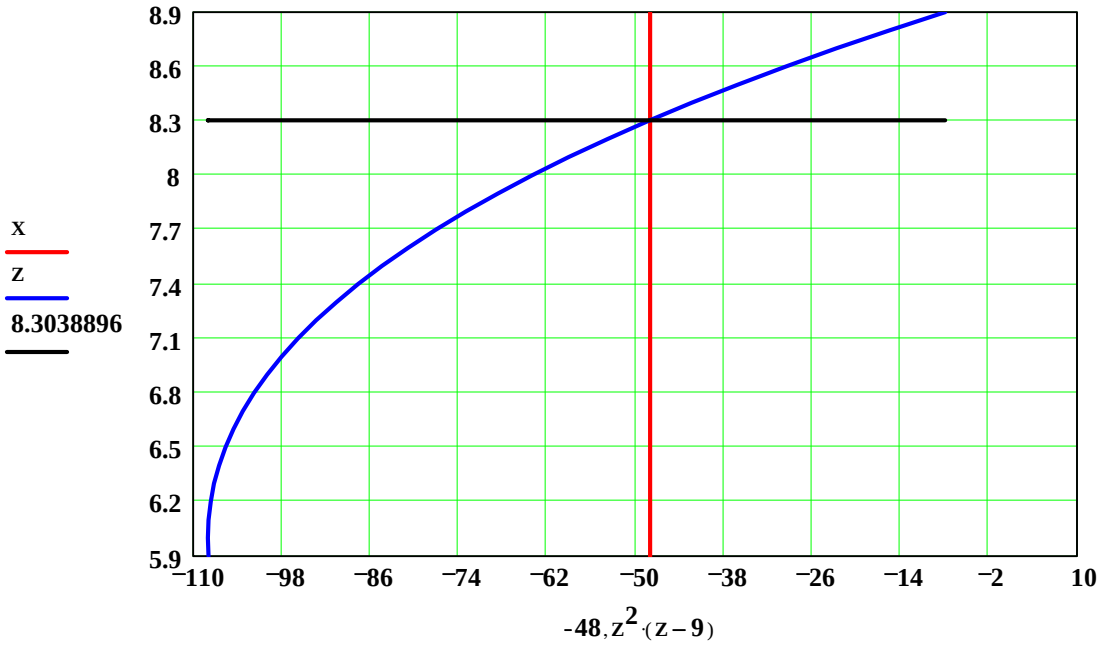
$$2\cdot M^3 - 6\cdot\left[(M+2)\cdot(M-4)^2\right] = 0$$

$$2\cdot M^3 - \left(6\cdot M^3 - 36\cdot M^2 + 192\right) = 0$$

$$4\cdot M^3 - 36\cdot M^2 + 192 = 0$$

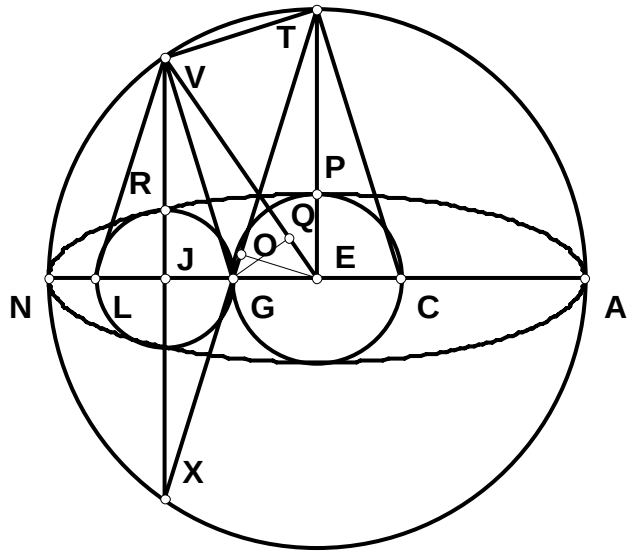
$$M^3 - 9\cdot M^2 + 48 = 0 \qquad M^2\cdot(M-9) + 48 = 0 \qquad M \equiv 8.303889634816388$$

$$\frac{2\cdot M^3}{(M+2)\cdot(M-4)^2} = 6 \qquad DE - \frac{AF}{M} = 0 \qquad Z := 5.9, 6 .. 8.9$$



Elliptic Progression Outtake Two 0507012

Angles TEV and EVJ equals CTG.



$N := 6.381 \quad AN := 2.792$

$EN := \frac{AN}{2} \quad ET := EN \quad EV := EN$

$EG := \frac{AN}{N} \quad EP := EG \quad GT := \sqrt{EG^2 + ET^2}$

$GO := \frac{EG^2}{GT} \quad GX := GT - 2 \cdot GO$

$JX := \frac{ET \cdot GX}{GT} \quad GJ := \frac{EG \cdot GX}{GT}$

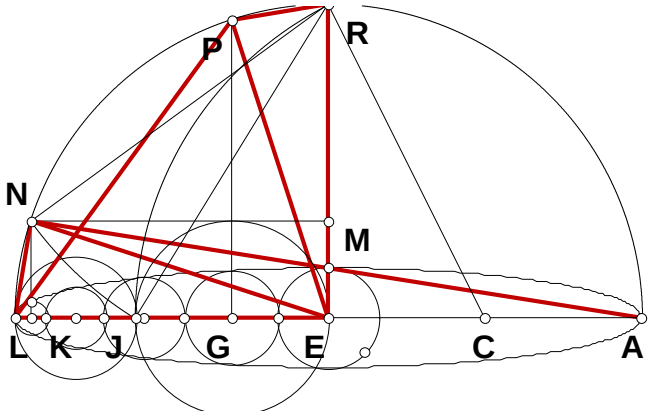
$\frac{ET}{EP} - \frac{JX}{GJ} = 0 \qquad JV := JX$

$EJ := EG + GJ$

$TV := \sqrt{ET^2 - 2 \cdot ET \cdot JV + JV^2 + EJ^2}$

$\frac{ET}{TV} - \frac{GT}{2 \cdot EG} = 0 \qquad EQ := \frac{EJ \cdot EG}{EV} \quad GQ := \frac{JV \cdot EQ}{EJ} \quad GQ - GJ = 0$

Outtake Three: Alternate Method: Pentasection Or Irrational Rationals 0507013



$AL := 1 \qquad AE := \frac{AL}{2} \qquad AC := \frac{AE}{2}$

$CE := AC \quad ER := AE \quad CR := \sqrt{CE^2 + ER^2}$

$CJ := CR \qquad EJ := CJ - CE$

$JR := \sqrt{EJ^2 + ER^2} \quad NR := JR$

$EN := AE \quad EM := \frac{EN^2 + ER^2 - NR^2}{2 \cdot ER}$

$KN := EM \quad EK := \sqrt{EN^2 - KN^2} \quad EL := AE \qquad KL := EL - EK \qquad LN := \sqrt{KL^2 + KN^2}$

$EG := \frac{EJ}{2} \qquad GL := EL - EG \quad AG := AE + EG \qquad GP := \sqrt{AG \cdot GL} \qquad PR := \sqrt{ER^2 - 2 \cdot ER \cdot GP + GP^2 + EG^2}$

$PR - LN = 0 \qquad AN := \sqrt{AL^2 - LN^2}$

Irrational **means the inability of a grammar to provide a name for a given thing. Many things are then irrational in Arithmetic due to the principles of the naming convention. Algebraic naming solves the problem by incorporating operands as part of a name. Algebra provides a degree of rationality then that is not achievable by Arithmetic. The following are some Algebraic names.**

$\frac{1}{2} - AE = 0 \qquad \frac{1}{4} - AC = 0 \qquad \frac{1}{4} \cdot \sqrt{5} - CR = 0 \qquad \frac{1}{4} \cdot \sqrt{5} - \frac{1}{4} - EJ = 0 \qquad \frac{1}{4} \cdot \sqrt{10 - 2 \cdot \sqrt{5}} - JR = 0$

$\frac{-1}{8} + \frac{1}{8} \cdot \sqrt{5} - EM = 0 \qquad \frac{1}{2} \cdot \sqrt{\frac{5}{8} + \frac{1}{8} \cdot \sqrt{5}} - EK = 0 \qquad \frac{1}{2} - \frac{1}{8} \cdot \sqrt{10 + 2 \cdot \sqrt{5}} - KL = 0$

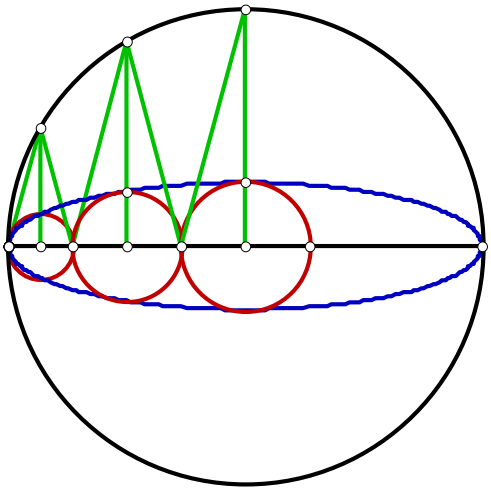
$\frac{1}{4} \cdot \sqrt{8 - 2 \cdot \sqrt{10 + 2 \cdot \sqrt{5}}} - LN = 0 \qquad \frac{-1}{8} + \frac{1}{8} \cdot \sqrt{5} - EG = 0 \qquad \frac{5}{8} - \frac{1}{8} \cdot \sqrt{5} - GL = 0$

$\frac{3}{8} + \frac{1}{8} \cdot \sqrt{5} - AG = 0 \qquad \frac{1}{8} \cdot \sqrt{10 + 2 \cdot \sqrt{5}} - GP = 0 \qquad \frac{1}{4} \cdot \sqrt{8 - 2 \cdot \sqrt{10 + 2 \cdot \sqrt{5}}} - PR = 0$

$\frac{1}{4} \cdot \sqrt{8 + 2 \cdot \sqrt{10 + 2 \cdot \sqrt{5}}} - AN = 0$

Elliptic Progression

050701

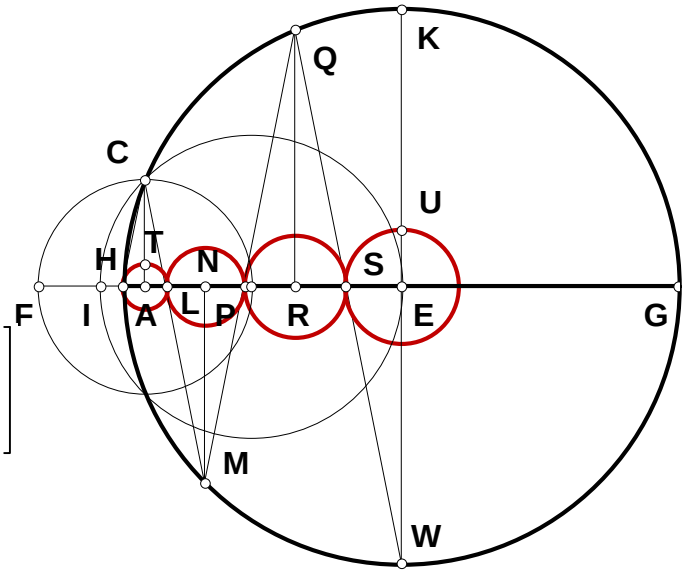


An Elliptic Progression takes place on a finite length of line. An Elliptic Progression may be defined in terms of a number of diameters of smaller circles, each defined by the same angle from the circumferance of the larger circle, from the center of a circle to its perimeter. When the sum of the number of those diameters minus one half the starting diameter are equal to the radius of the larger circle, the angle that defined the smaller circles will divide the larger circle evenly and the same number of times as the total number of smaller circles. This means that the division of a circle into equal angles is based on a simple elliptic funciton.

$\Delta := 2 \qquad N := 0 .. \Delta$

$AC_0 := .552 \qquad CP_0 := \sqrt{2 \left(AC_0\right)^2}$

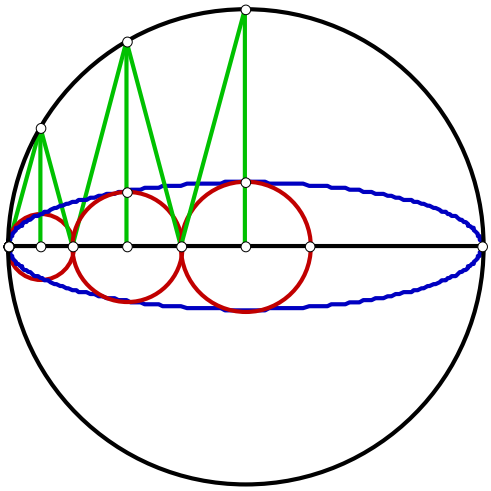
$$\begin{bmatrix} AC_{N+1} \\ CP_{N+1} \end{bmatrix} := \begin{bmatrix} CP_N \\ \sqrt{\left(AC_0\right)^2 + \left[\left(AC_N + CP\right)_N\right]^2} \end{bmatrix}$$



$CE := AC_\Delta \qquad AE := \sqrt{CE^2 - \left(AC_0\right)^2}$

$EH := CE \quad EK := CE \quad AH := EH - AE \quad AT := AH \qquad EU := \frac{AH \cdot EK}{AC_0}$

$EU = 0.287$



Angles and the Ellipse 050801.mcd

$AC := 1 \qquad CP := \sqrt{2\ AC^2}$

$AP := AC \qquad EP := CP$

$CE := \sqrt{AC^2 + (AP + EP)^2}$

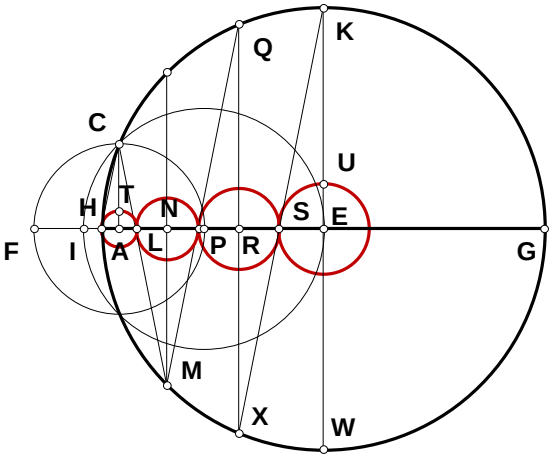
$EK := CE \quad EH := CE$

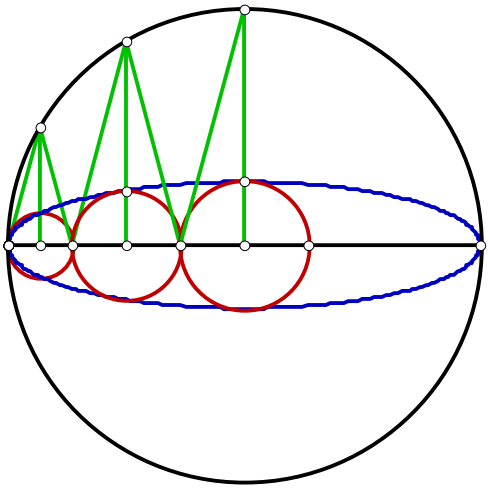
$AE := \sqrt{CE^2 - AC^2}$

$AH := EH - AE$

$AT := AH \qquad EU := \frac{AT \cdot EK}{AC}$

$\frac{EK}{EU} - \left(1 + \sqrt{2} + \sqrt{2} \cdot \sqrt{2 + \sqrt{2}}\right) = 0$

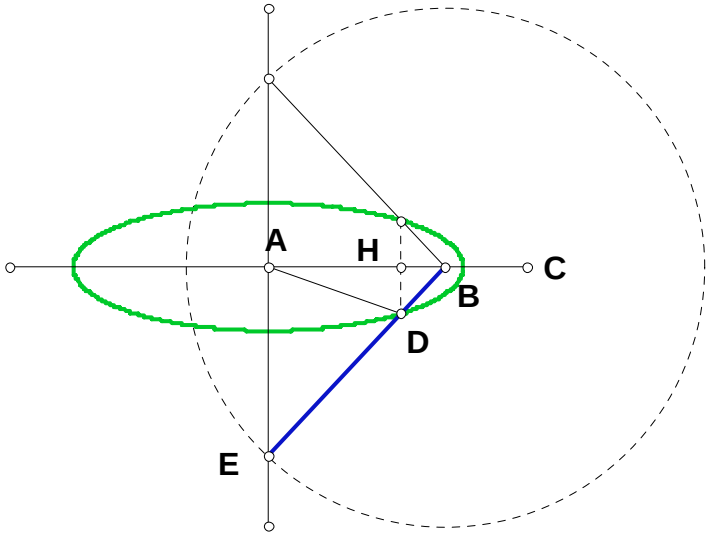




An Elliptic Progression takes place on a finite length of line. An Elliptic Progression may be defined in terms of a number of diameters of smaller circles, each defined by the same angle from the circumferance of the larger circle and from the center of a circle to its perimeter. When the sum of the number of those diameters minus one half the starting diameter are equal to the radius of the larger circle, the angle that defined the smaller circles will divide the larger circle evenly and the same number of times as the total number of smaller circles. This means that the division of a circle into equal angles may be expressed as an elliptic function.

Straight Line Ellipse

041904



Cardinal

$U := 1 \qquad R_1 := 3$

$R_2 := 2 \qquad AC := U$

$BE := AC \qquad BD := \frac{BE}{R_1}$

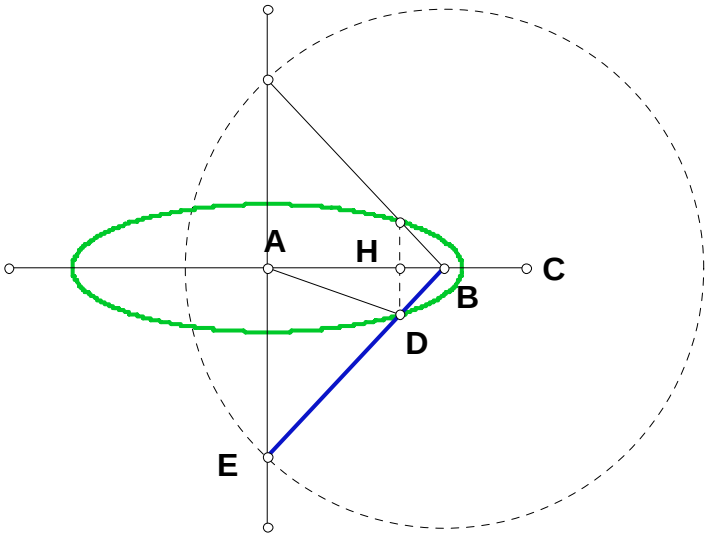
$AB := \frac{AC}{R_2} \qquad AE := \sqrt{BE^2 - AB^2}$

$BH := \frac{AB \cdot BD}{BE} \qquad DH := \frac{AE \cdot BD}{BE}$

$AH := AB - BH \qquad AD := \sqrt{AH^2 + DH^2}$

$AD := \frac{U}{(R_1 \cdot R_2)} \cdot \sqrt{(R_1)^2 - 2 \cdot R_1 + (R_2)^2} \qquad \frac{\sqrt{(R_1)^2 - 2 \cdot R_1 + (R_2)^2}}{R_1 \cdot R_2} - \frac{AD}{U} = 0$

Ordinal



$N_1 := 1.344 \qquad N_2 := .3$

$N_3 := .5$

$AC := N_1 \qquad BD := N_2$

$AB := N_3 \qquad AF := AC$

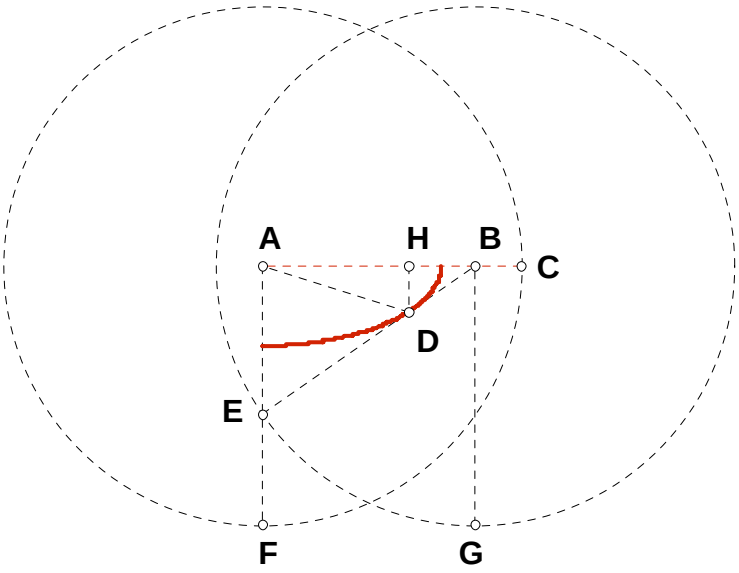
$BE := AC \qquad AE := \sqrt{BE^2 - AB^2}$

$BH := \frac{AB \cdot BD}{BE} \qquad DH := \frac{AE \cdot BD}{BE}$

$AH := AB - BH$

$AD := \sqrt{AH^2 + DH^2}$

$\sqrt{\frac{1}{N_1} \cdot \left[(N_3)^2 \cdot N_1 - 2 \cdot (N_3)^2 \cdot N_2 + (N_2)^2 \cdot N_1 \right]} - AD = 0$



Straight Line Ellipse

041904B

$N_1 := 1.344 \quad N_2 := .415$

$N_3 := 1.102$

$AC := N_1 \quad BD := N_2$

$AB := N_3 \quad AF := AC$

$BE := AC \quad AE := \sqrt{BE^2 - AB^2}$

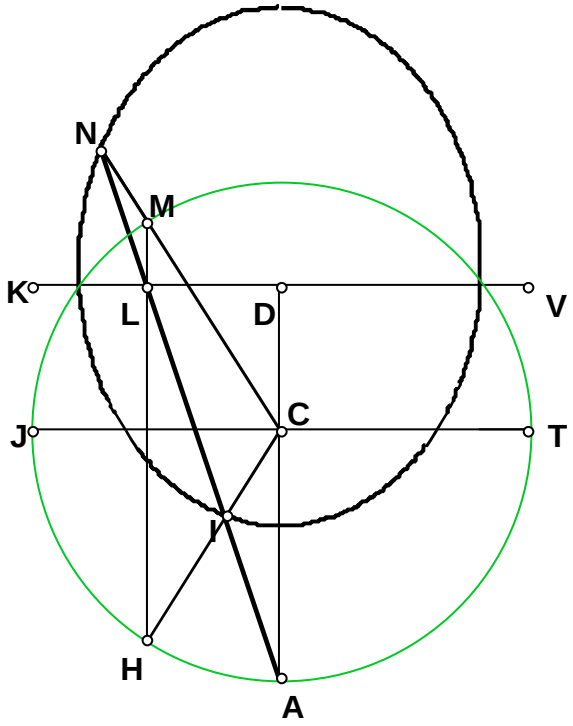
$BH := \frac{AB \cdot BD}{BE} \quad DH := \frac{AE \cdot BD}{BE}$

$AH := AB - BH$

$AD := \sqrt{AH^2 + DH^2}$

$$AD := \sqrt{\frac{1}{N_1} \cdot \left[(N_3)^2 \cdot N_1 - 2 \cdot (N_3)^2 \cdot N_2 + (N_2)^2 \cdot N_1 \right]}$$

Another Ellipse 031405a



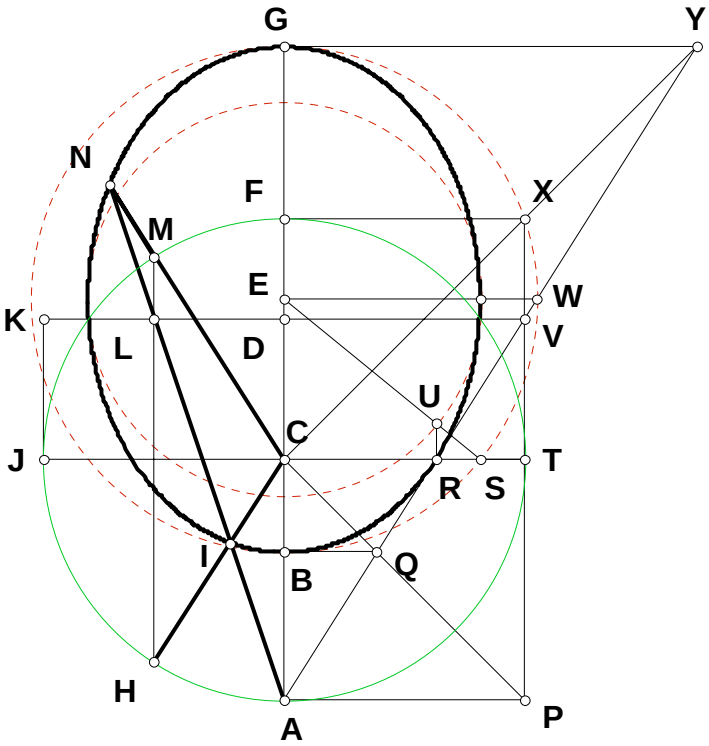
The locus formed by N and I as determined by L provides an ellipse. Privide an Algebraic name for the Major and Minor Axis.

$N_1 := 1.25 \qquad N_2 := 3$

$AC := N_1 \qquad AD := N_2$

$DV := AC \qquad AV := \sqrt{AD^2 + DV^2}$

$AF := 2 \cdot AC \qquad VX := AF - AD$



$$AY := \frac{AV \cdot AC}{AC - VX}$$

$$AG := \frac{AD \cdot AY}{AV}$$

$$BC := \frac{AC \cdot AC}{AC + AD}$$

$CG := AG - AC$

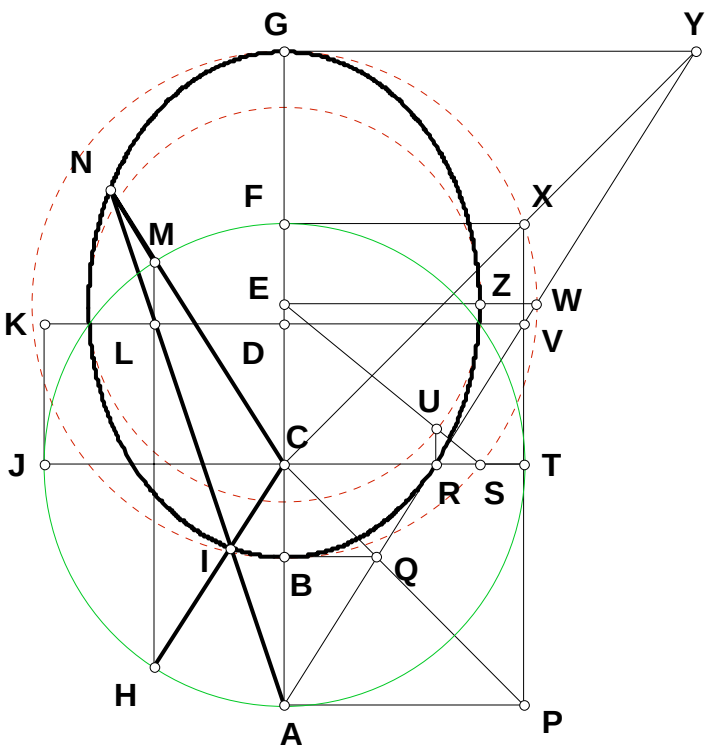
$BG := BC + CG$

$$BE := \frac{BG}{2}$$

$CE := BE - BC \qquad ES := BE$

$$CS := \sqrt{ES^2 - CE^2}$$

$$CR := \frac{DV \cdot AC}{AD}$$



$$EU := \frac{ES \cdot CR}{CS}$$

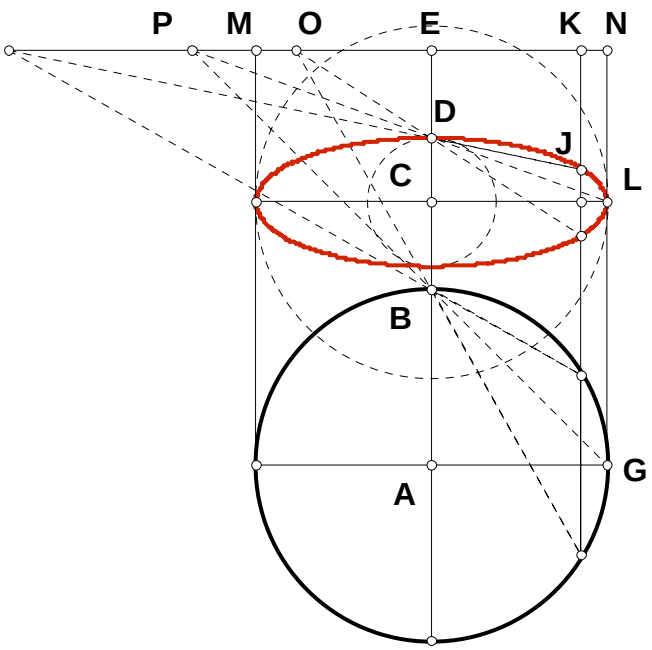
$$EZ := EU$$

$$EZ - \frac{N_1^2 \cdot \sqrt{N_2^2 - N_1^2}}{(N_1 + N_2) \cdot (N_2 - N_1)} = 0$$

$$BG - \frac{2 \cdot N_1^2 \cdot N_2}{(N_1 + N_2) \cdot (N_2 - N_1)} = 0$$

An Ellipse

032305a



$N_1 := 1 \qquad N_2 := 2$

$N_3 := .5$

$AB := N_1 \qquad MN := 2 \cdot AB$

$BE := N_2 \qquad BD := N_3$

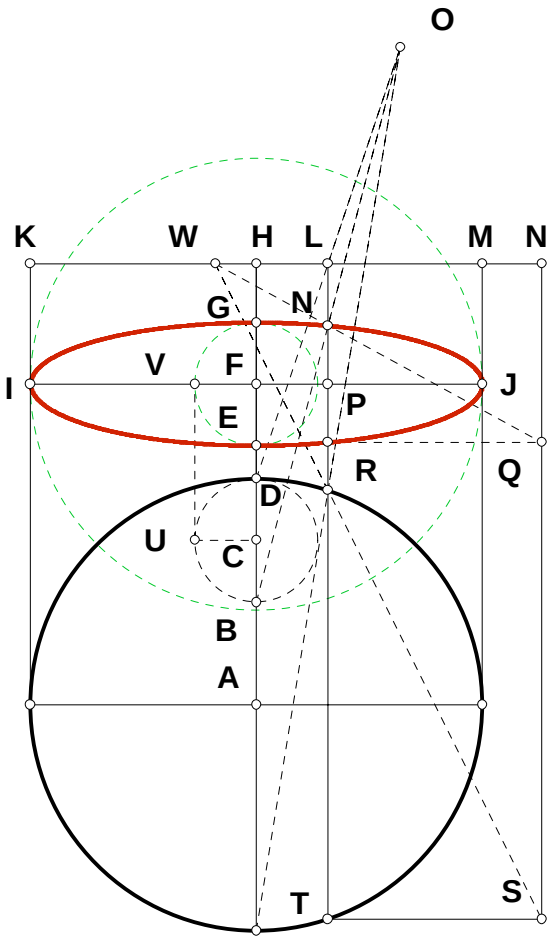
$DE := BE - BD \qquad AG := AB$

$EP := \frac{AG \cdot BE}{AB} \qquad EN := AB$

$NL := \frac{DE \cdot (EP + EN)}{EP}$

$CE := NL \qquad CD := CE - DE$

$N_1 \cdot \frac{(N_2 - N_3)}{N_2} - CD = 0$


O
K
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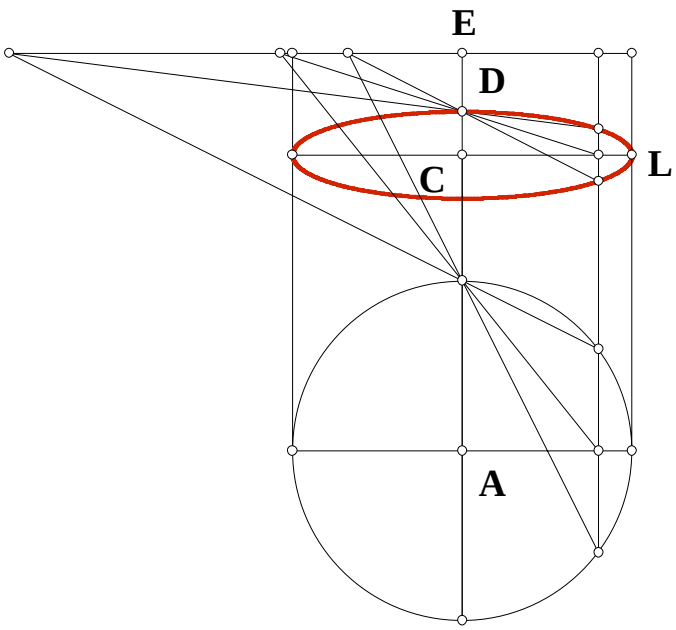


AE = 2.069 inches

CE = 0.529 inches

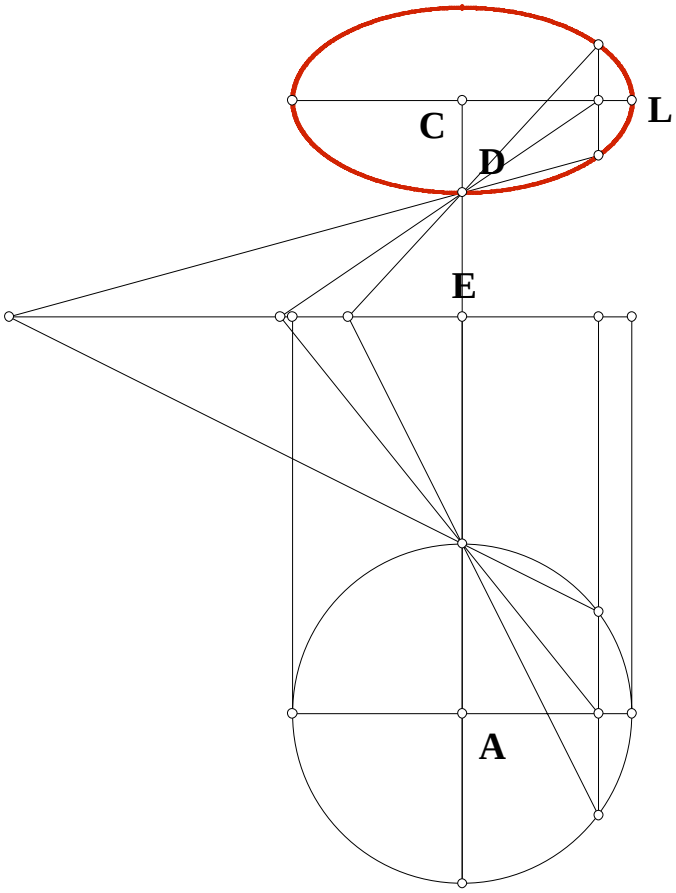
LC = 0.885 inches

CD = 0.227 inches

$$\frac{AE}{CE} = 3.909$$

$$\frac{LC}{CD} = 3.909$$

$$\frac{AE}{CE} - \frac{LC}{CD} = 0.000$$



AE = 2.069 inches

CE = 1.128 inches

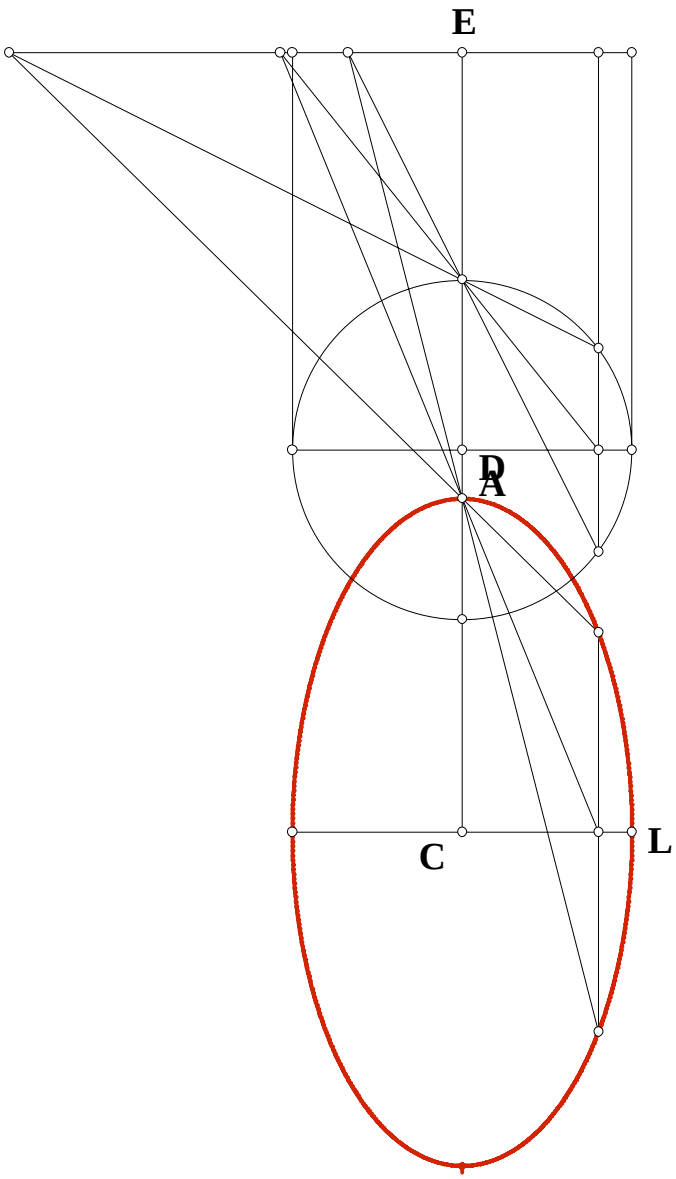
LC = 0.885 inches

CD = 0.483 inches

$$\frac{AE}{CE} = 1.834$$

$$\frac{LC}{CD} = 1.834$$

$$\frac{AE}{CE} - \frac{LC}{CD} = 0.000$$



AE = 2.069 inches

CE = 4.062 inches

LC = 0.885 inches

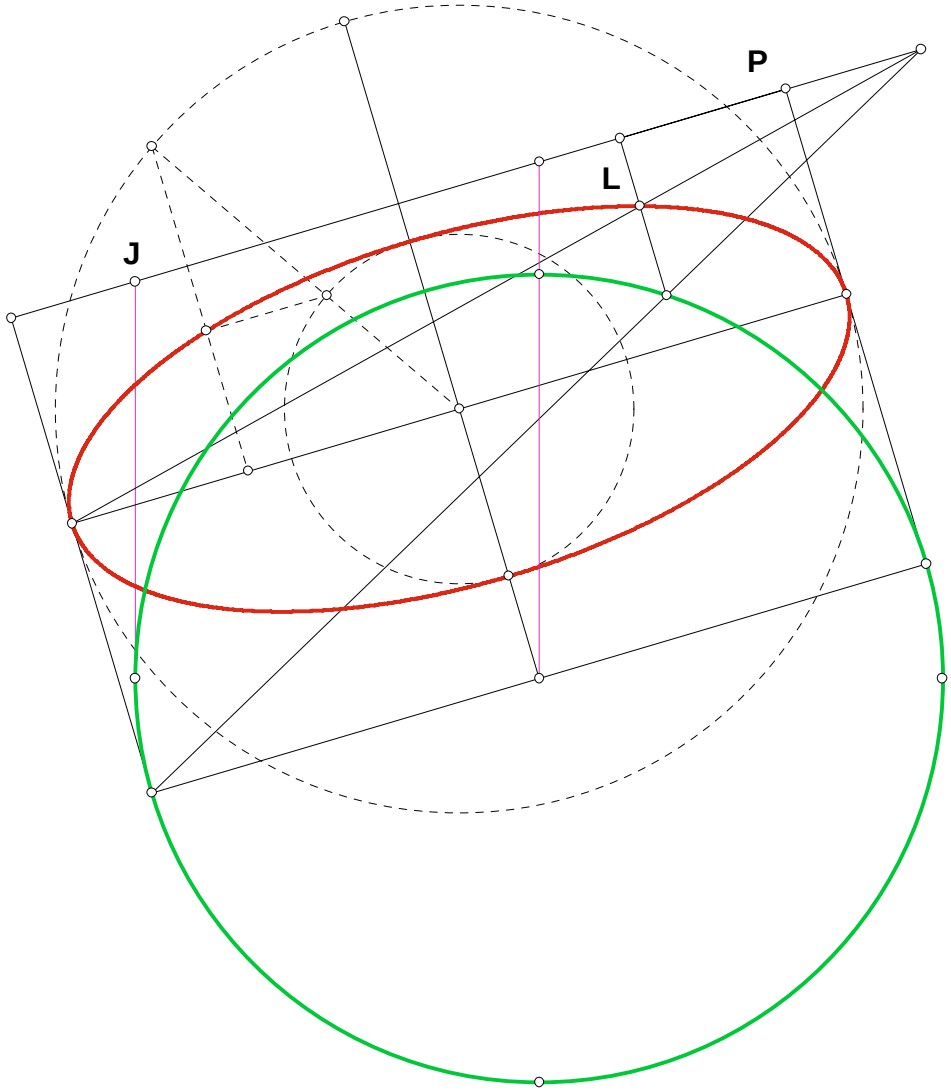
CD = 1.739 inches

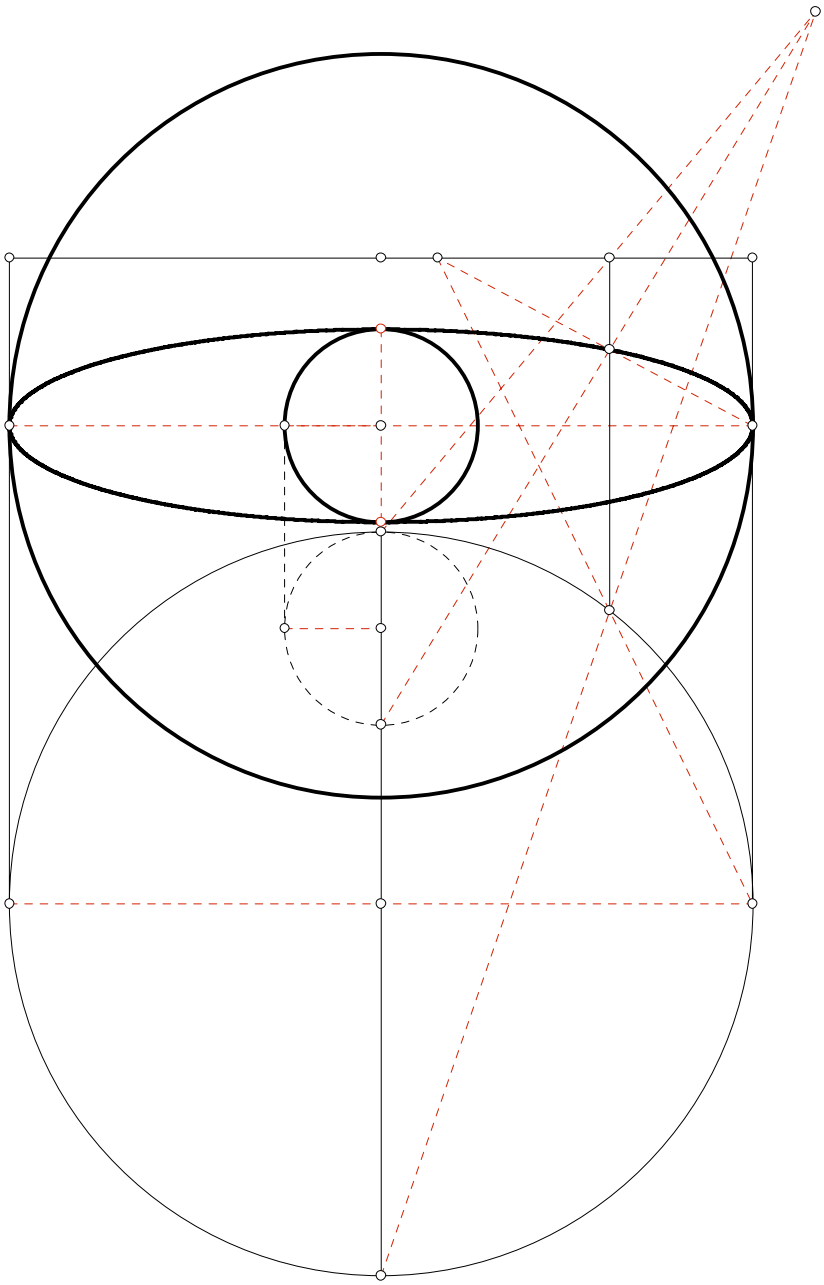
$\frac{AE}{CE} = 0.509$

$\frac{LC}{CD} = 0.509$

$\frac{AE}{CE} - \frac{LC}{CD} = 0.000$

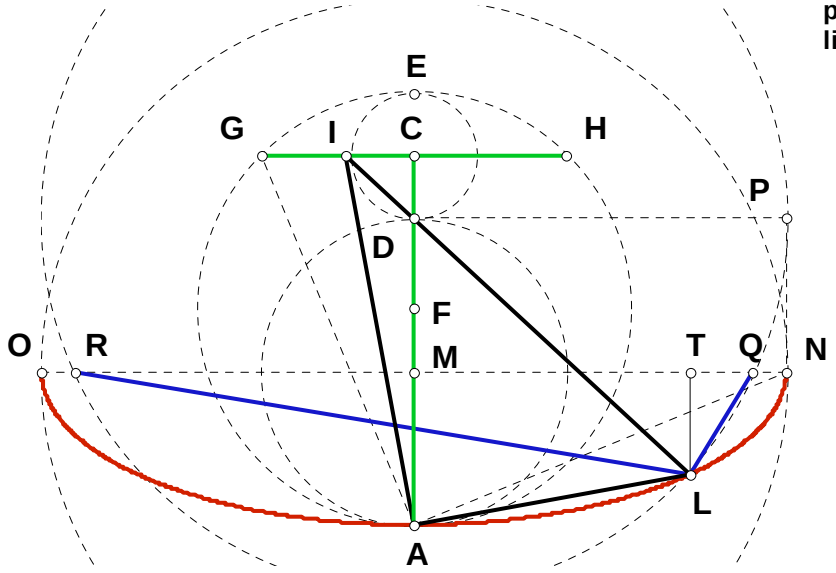
032405a.gsp





Elipse Projected From a Perpendicular. 032905

Let AC be some perpendicular on some line GH.



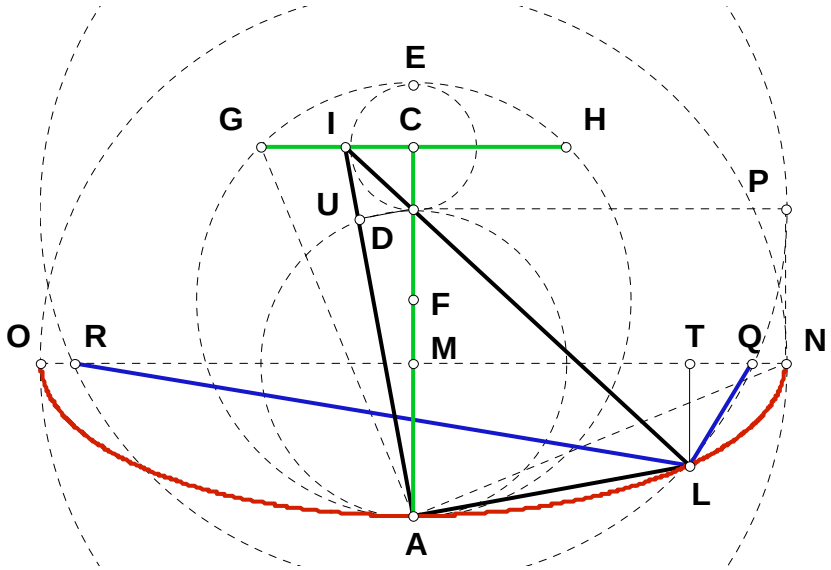
$N_1 := 1.9167$

$N_2 := .3244$

$N_3 := .437$

$AC := N_1 \quad CD := N_2 \quad CE := CD \quad CG := \sqrt{CE \cdot AC} \quad GH := 2 \cdot CG$

$GI := N_3 \quad CI := CG - GI \quad AD := AC - CD \quad AI := \sqrt{AC^2 + CI^2} \quad AM := \frac{AD}{2}$



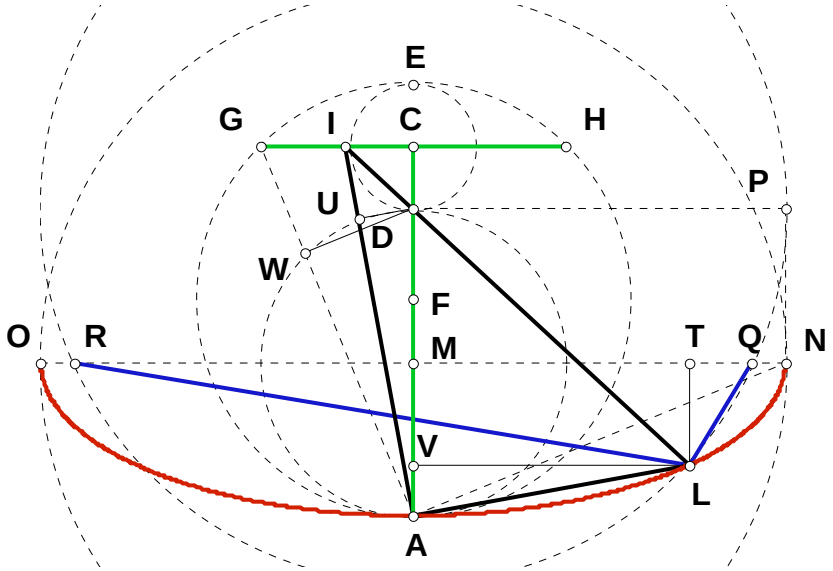
$DM := AM$

$DU := \frac{CI \cdot AD}{AI}$

$AU := \frac{AC \cdot AD}{AI}$

$IU := AI - AU$

$AL := \frac{DU \cdot AI}{IU}$



$$IL := \sqrt{AI^2 + AL^2}$$

$$DI := \sqrt{DU^2 + IU^2}$$

$$DL := IL - DI$$

$$DV := \frac{CD \cdot DL}{DI}$$

$$MV := DV - DM$$

$$AV := AM - MV$$

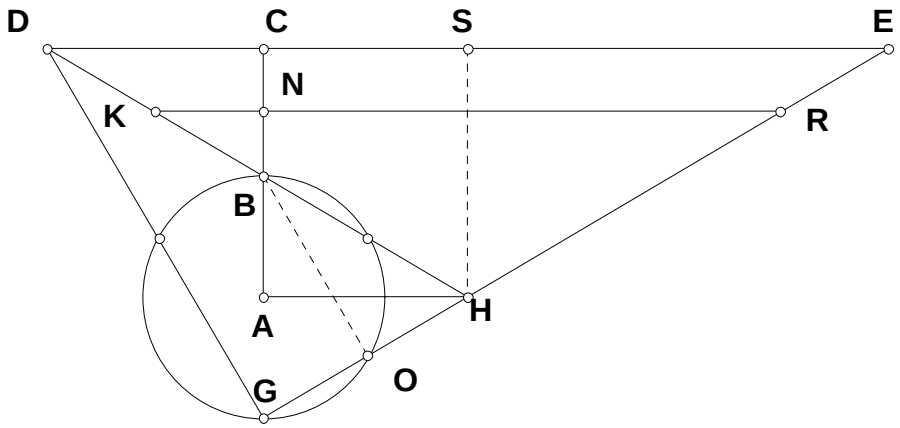
$$LV := \sqrt{AL^2 - AV^2}$$

$$MT := LV$$

$$AG := \sqrt{CG^2 + AC^2} \quad DW := \frac{CG \cdot AD}{AG} \quad AW := \frac{AC \cdot AD}{AG} \quad GW := AG - AW$$

$$AN := \frac{DW \cdot AG}{GW} \qquad MN := \sqrt{AN^2 - AM^2} \qquad ON := 2 \cdot MN$$

$$ON - \sqrt{\left(N_2 - N_1\right)^2 \cdot \frac{N_1}{N_2}} = 0$$



033005c

N^3 and More

$N_1 := 1$

$N_2 := 2 \quad A := N_2$

$N_3 := 4 \quad N := N_3$

AB is the unit AH/AB is the constant one. BC/BN is constant two.

$$AB := N_1 \quad AH := N_2 \quad BH := \sqrt{AB^2 + AH^2} \quad GO := \frac{AB \cdot 2 \cdot AB}{BH} \quad HO := BH - GO$$

$$DH := \frac{BH \cdot BH}{HO} \quad AC := \frac{AB \cdot DH}{BH} \quad BO := \sqrt{BH^2 - HO^2} \quad DG := \frac{BO \cdot BH}{HO}$$

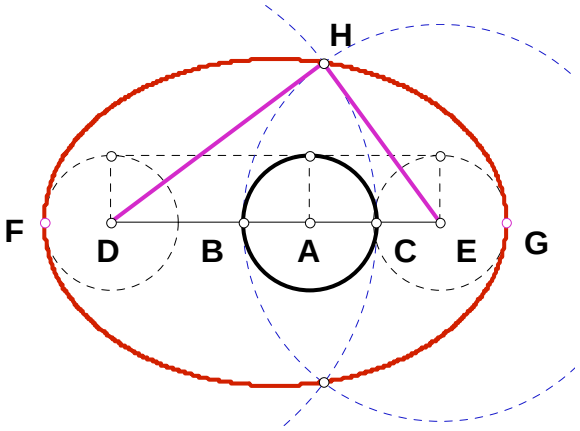
$$DE := \frac{BH \cdot DG}{AB} \quad CD := \frac{DG^2}{DE} \quad BC := AC - AB \quad CE := DE - CD$$

$$\frac{CE}{BC} - \left(\frac{AH}{AB}\right)^3 = 0 \qquad \frac{N_2^3}{N_1^3} - \frac{CE}{BC} = 0$$

More $\left(A^3 \cdot N\right) - (N - 1) \cdot A$ **Let** N_3 **be N**

$$BN := \frac{BC}{N_3} \quad KN := \frac{CD}{N_3} \quad CG := AC + AB \quad GN := 2 \cdot AB + \frac{BC}{N_3} \quad NR := \frac{CE \cdot GN}{CG}$$

$$\left[\frac{N_2^3}{N_1^3} \cdot N_3 - \frac{N_2 \cdot \left(N_3 - 1\right)}{N_1}\right] - \frac{NR}{BN} = 0 \qquad A^3 \cdot N - (N - 1) \cdot A = 26 \qquad \frac{NR}{BN} = 26$$



Just Another Ellipse

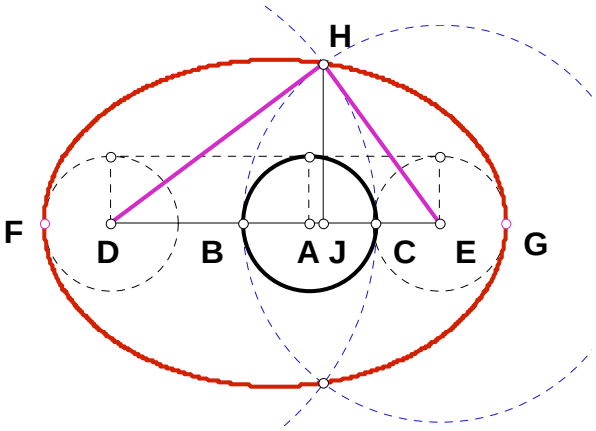
033105b

Given the difference between the foci and difference between the proportional radii, etc., etc.

$N_1 := 1.708 \quad N_2 := .693 \quad N_3 := 1.032 \quad N_4 := 2.435$

$DE := N_1 \quad BC := N_2 \quad FG := DE + BC \quad AB := \frac{BC}{2} \quad AD := N_3$

$CD := AD + AB \quad BE := DE - AD + AB \quad EH := BE \quad DH := CD$



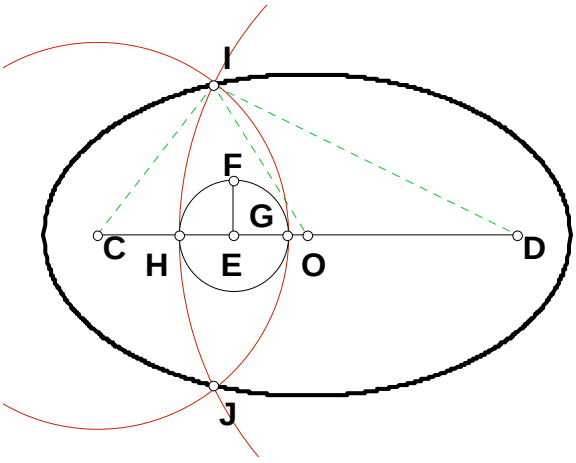
$$DJ := \frac{DH^2 + DE^2 - EH^2}{2 \cdot DE}$$

$$HJ := \sqrt{DH^2 - DJ^2}$$

$HJ = 0.825$

$$\frac{\sqrt{-N_3 \cdot (N_3 - N_1) \cdot N_2 \cdot (N_2 + 2 \cdot N_1)}}{N_1} - HJ = 0$$

041205



$N_1 := 2.188 \quad N_2 := .278$

$N_3 := 3.095$

$CD := N_1 \quad CO := \frac{CD}{2}$

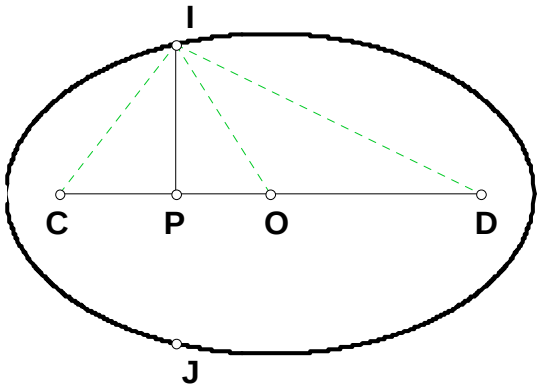
$EF := N_2 \quad CE := \frac{CD}{N_3}$

$CG := CE + EF$

$DH := CD - CG + 2 \cdot EF$

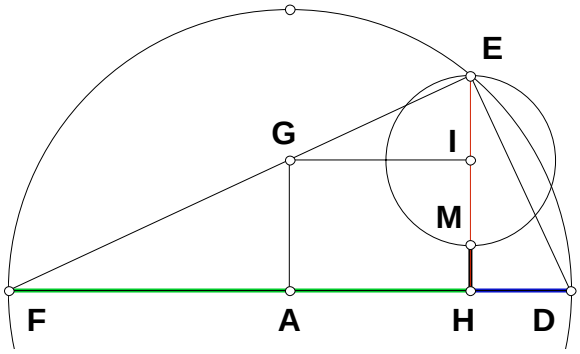
$CI := CG \quad DI := DH \quad IO := \frac{\sqrt{2 \cdot CI^2 - CD^2 + 2 \cdot DI^2}}{2}$

$$IP := \frac{\sqrt{(-CD + DI - CI)\,(CD + DI + CI)\,(CD - DI - CI)\,(CD + DI - CI)}}{2 \cdot CD}$$



$$2 \cdot \frac{\sqrt{N_2 \cdot (N_1 + N_2) \cdot (N_3 - 1)}}{N_3} - IP = 0$$

N^3 N Cubed 041305b



$N_1 := 1 \qquad N_2 := 36$

$DH := N_1 \quad FH := N_2$

$DF := DH + FH \quad AD := \frac{DF}{2}$

$EH := \sqrt{DH \cdot FH} \quad HI := \frac{EH \cdot AD}{FH}$

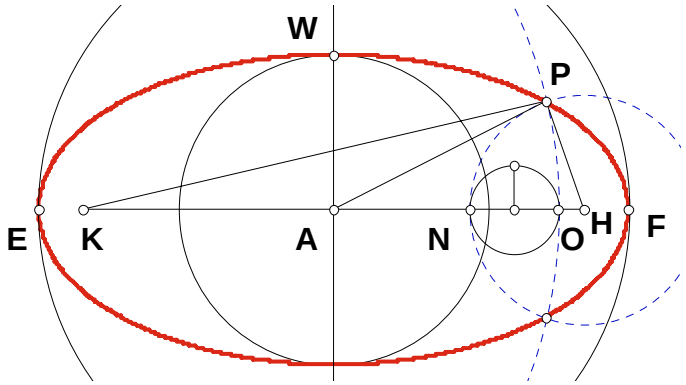
$HM := EH - 2 \cdot (EH - HI)$

$$\frac{FH}{HM} - \left(\frac{DH}{HM}\right)^3 = 0$$

$DF := \sqrt{DH^2 + EH^2} \qquad EF := \sqrt{FH^2 + EH^2}$

$$\frac{FH}{HM} - \left(\frac{EF}{DF}\right)^3 = 0$$

$$\frac{FH}{HM} = 216 \qquad \left(\frac{FH}{DH}\right)^{1.5} = 216$$



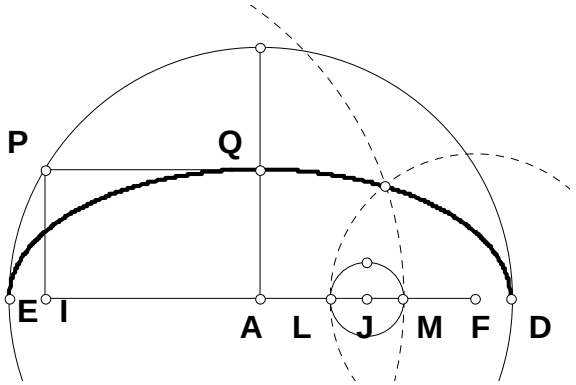
042205

Given HK, HF, AP provide HP and KP.

$N_1 := 2.604$

$N_2 := .229$

$N_3 := 1.237$



042205B

Given the major axis and the difference between the two foci, whatis the minor axis?

$N_1 := 2.604$

$N_2 := 2.234$

$DE := N_1 \quad FI := N_2 \quad EI := \frac{DE - FI}{2} \quad DI := DE - EI \quad EP := \sqrt{EI \cdot DI}$

$AQ := EP$

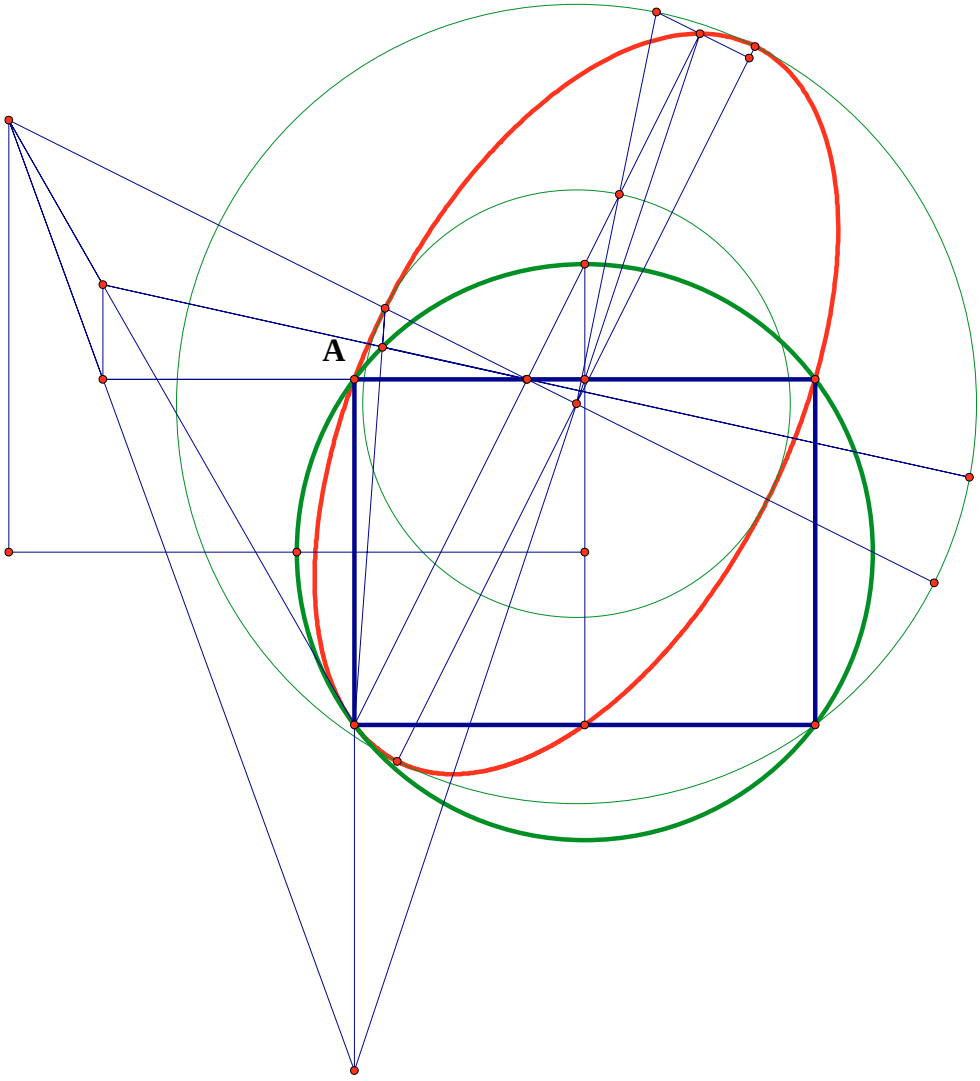
$$AQ - \frac{1}{2}\cdot\sqrt{\left(N_1 + N_2\right)\cdot\left(N_1 - N_2\right)} = 0$$

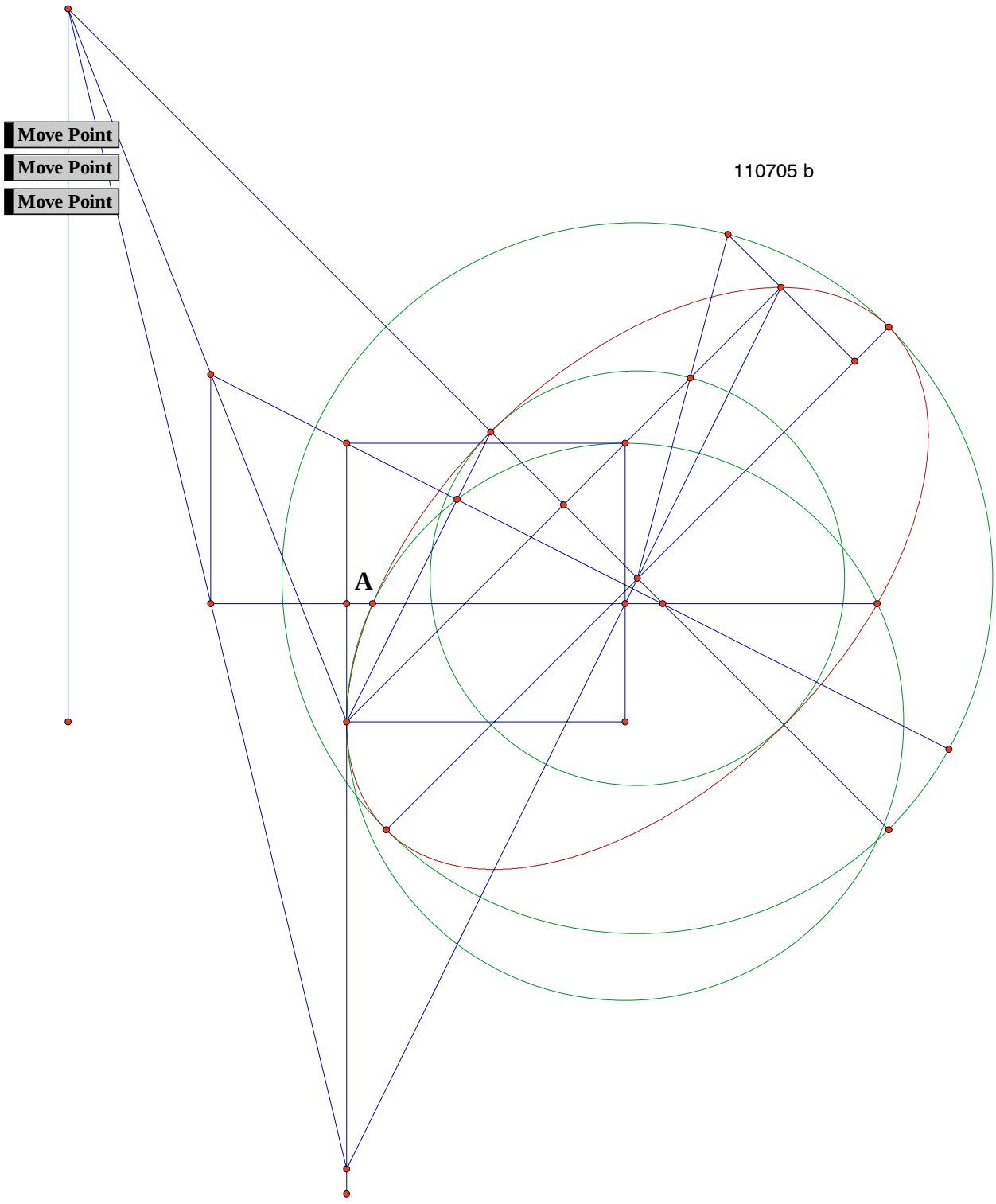
$N_2 := AQ$

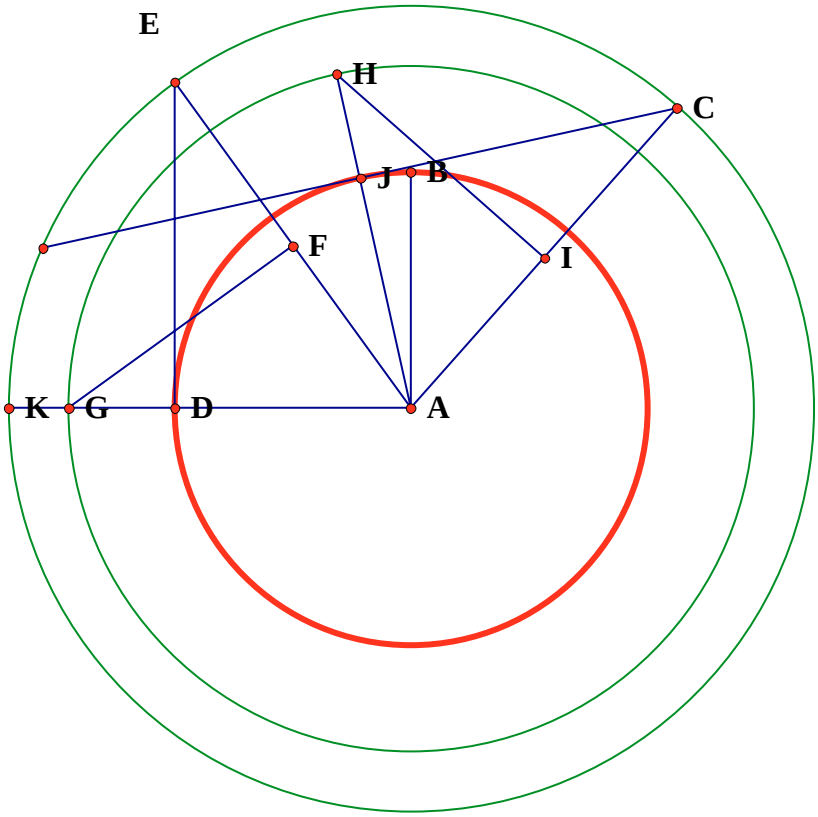
What are the foci if given the major and minor?

$$FI - \sqrt{N_1^2 - 4\cdot N_2^2} = 0$$

110705 a




Move Point
Move Point
Move Point
110705 b
A



110706 A. MCD

Going around in a circle

What is the tanget to AD from C?
Although no one in their right mind would do this for a circle, it is essential as an introduction to finding the inverse ellilpse for any external point to it.

$N_1 := 3.12208$

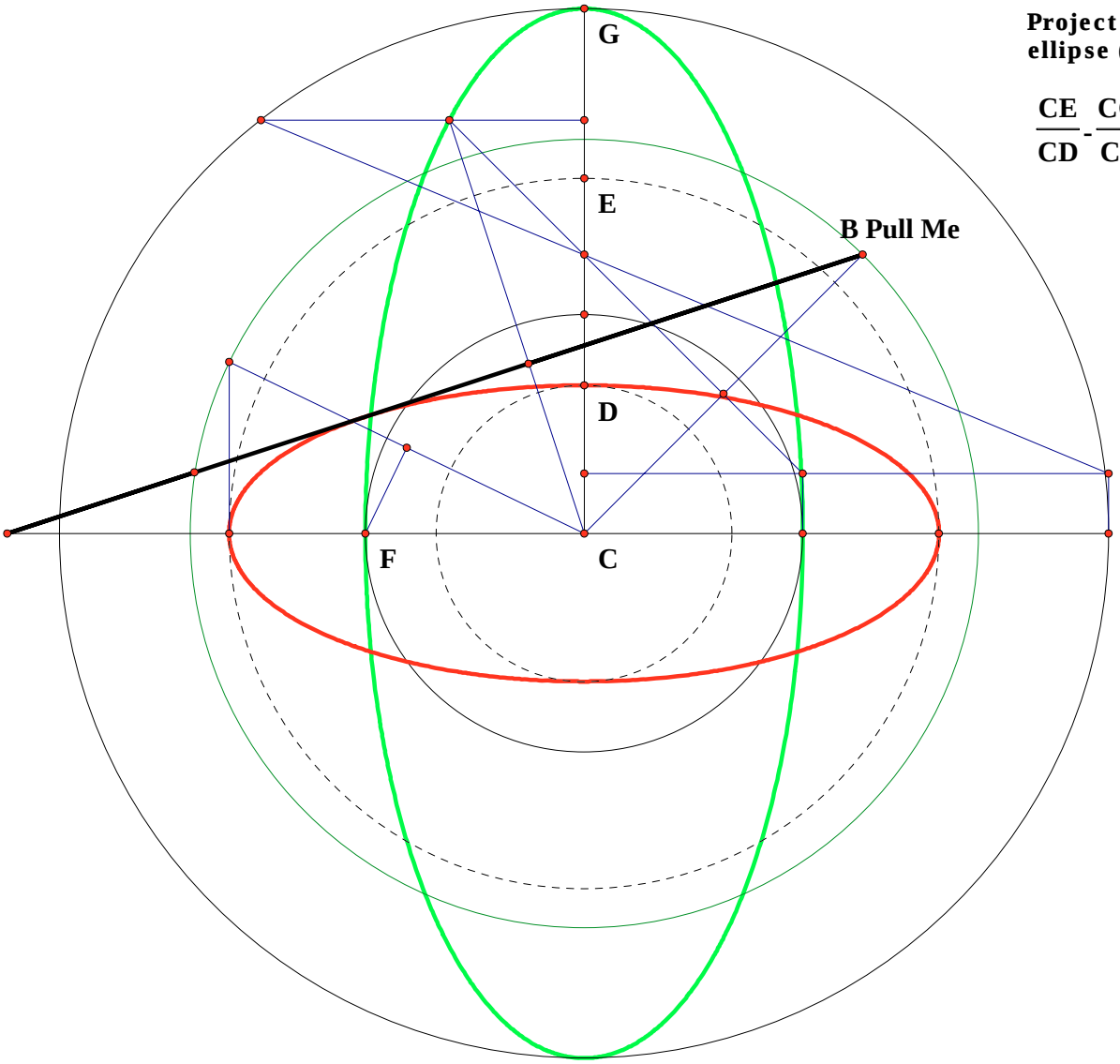
$N_2 := 5.31813$

$AD := N_1 \quad AC := N_2 \quad AE := AC$

$DE := \sqrt{AE^2 - AD^2} \quad AF := \frac{AE}{2} \quad AG := \frac{AE \cdot AF}{AD} \quad AH := AG \quad AI := \frac{AC}{2}$

$AJ := \frac{AI \cdot AC}{AH} \quad AJ - N_1 = 0 \quad CJ := \sqrt{AC^2 - AJ^2} \quad CJ = 4.305$

From any point B construct a tangent to any ellipse (red).



Project the inverse ellipse (green) and solve.

$$\frac{CE}{CD} - \frac{CG}{CF} = 0.00000$$

Show Axes

Given an Ellipse

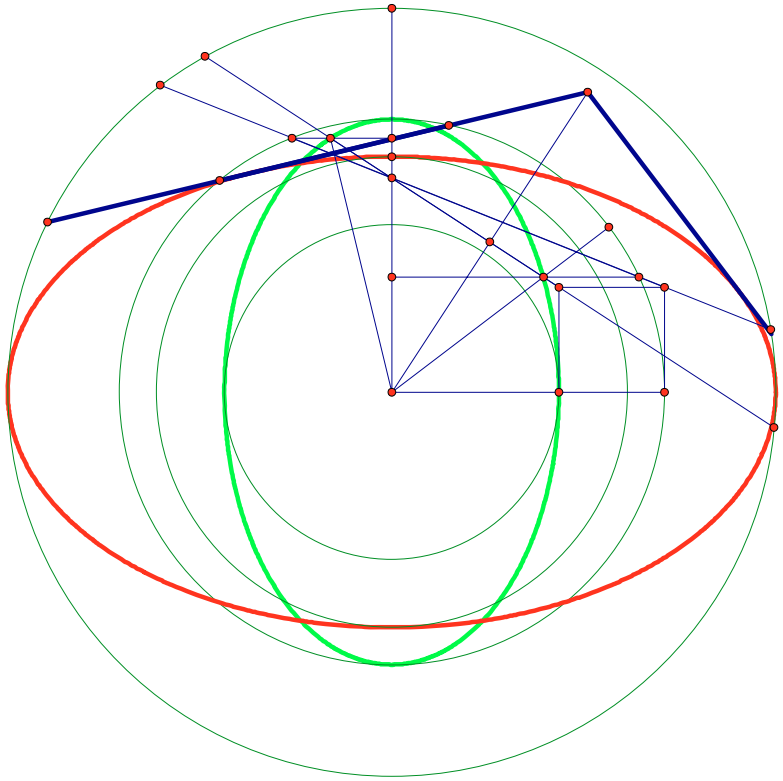
Given Any Point

Find Inverse Proportional Ellipse

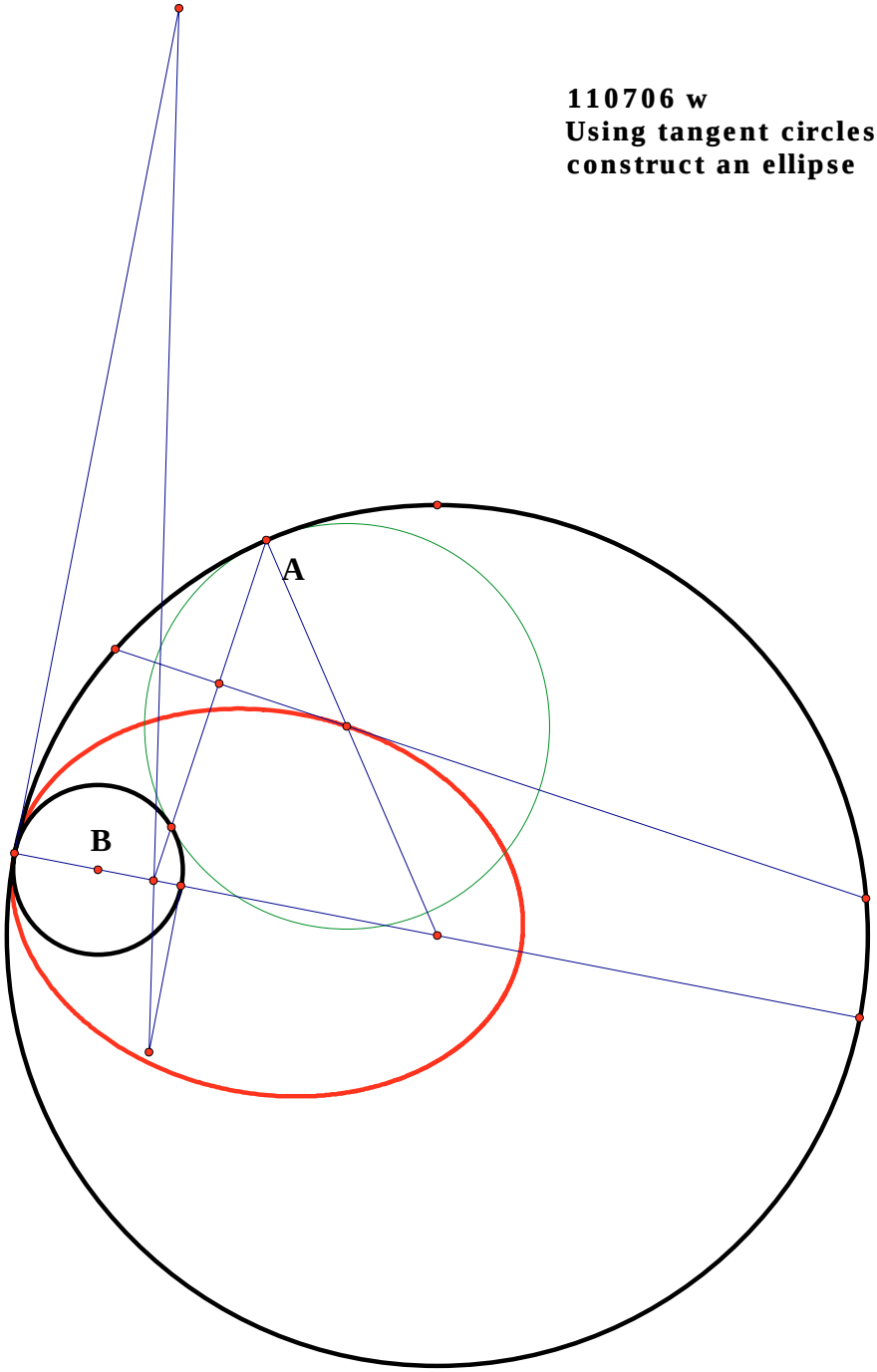
Hide Inverse Proportional Ellipse

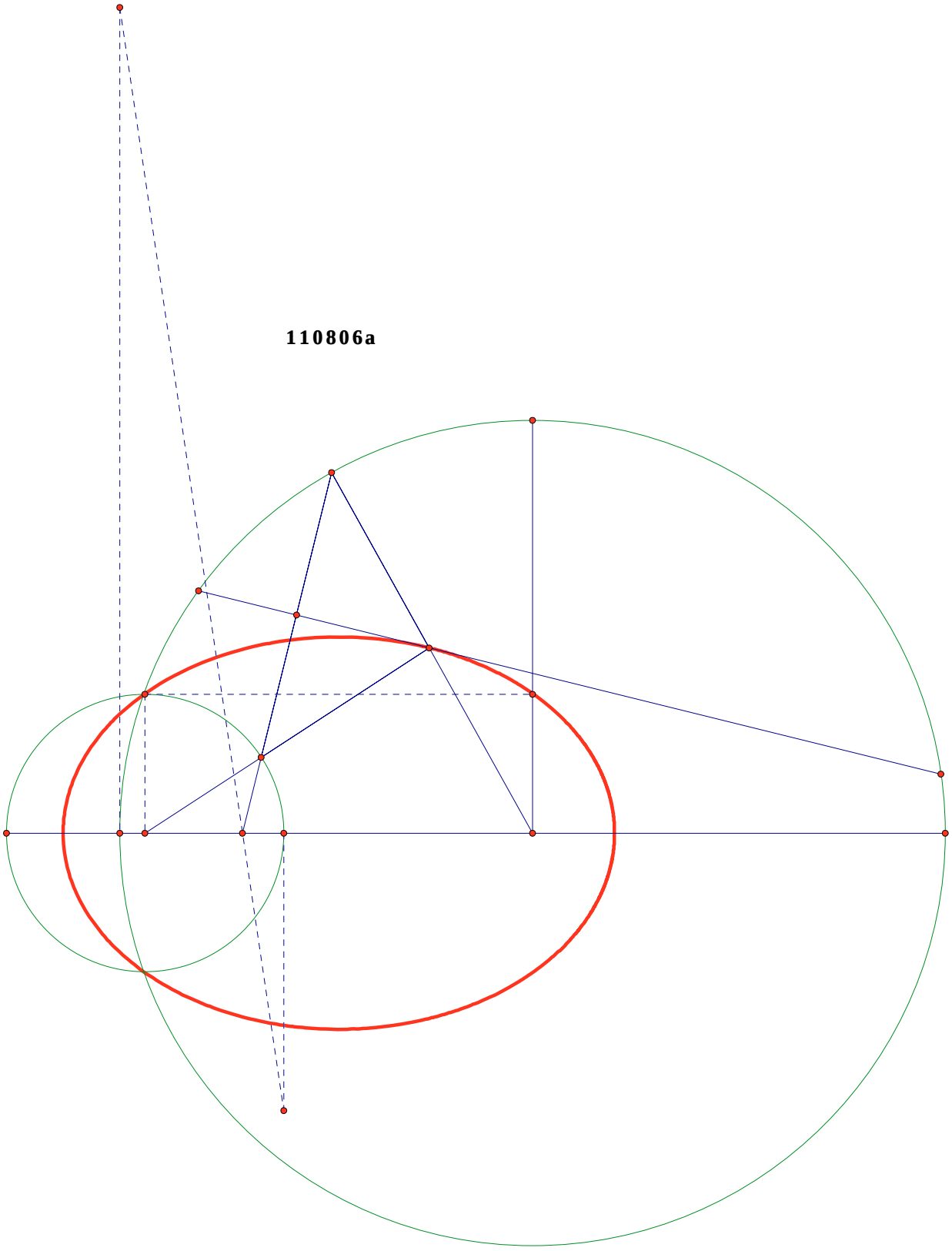
Hide Objects

Hide Objects

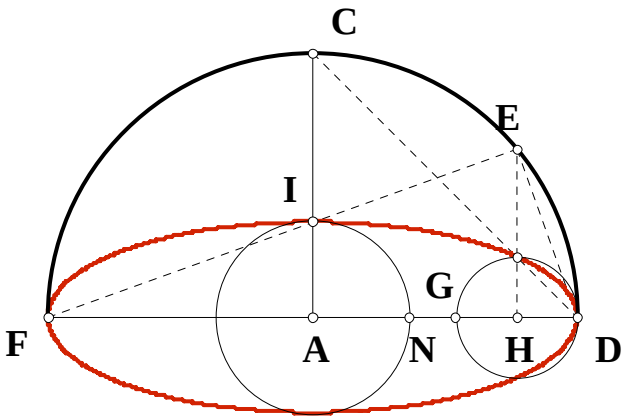


110706 w
Using tangent circles
construct an ellipse




110806a

060807A MCD



$N_1 := 1 \qquad N_2 := .49$

$DF := N_1 \qquad AI := N_2$

$AF := \frac{DF}{2} \qquad AN := AI \quad AD := AF$

$FI := \sqrt{AF^2 + AI^2} \qquad DE := \frac{AI \cdot DF}{FI}$

$DH := \frac{DE^2}{DF} \qquad GH := DH$

$GN := AD - (AN + GH + DH)$

Some Algebraic Names

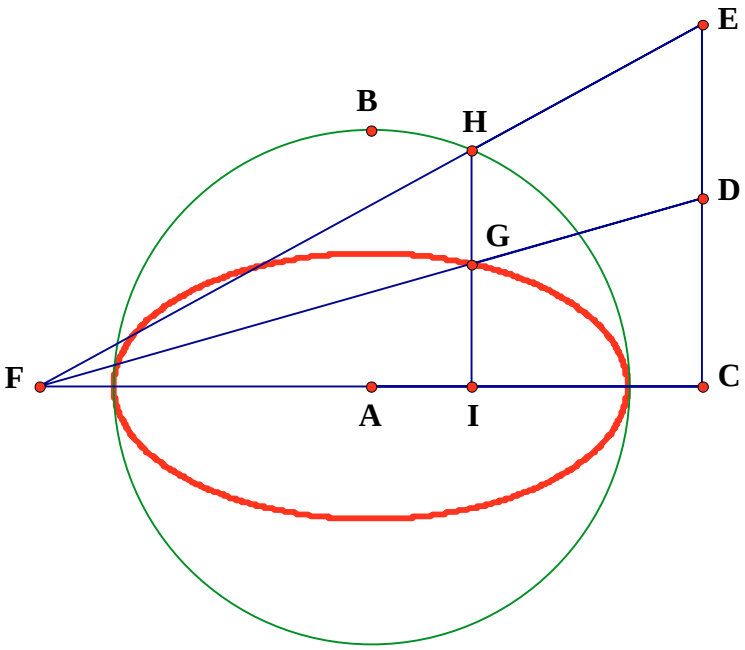
$$\frac{N_1}{2} - AF = 0 \qquad \frac{1}{2}\cdot\sqrt{(N_1)^2 + 4\cdot(N_2)^2} - FI = 0 \qquad 2\cdot N_2\cdot\frac{N_1}{\sqrt{(N_1)^2 + 4\cdot(N_2)^2}} - DE = 0$$

$$\frac{4\cdot(N_2)^2\cdot N_1}{(N_1)^2 + 4\cdot(N_2)^2} - DH = 0 \qquad \frac{\left[-8\cdot(N_2)^3 - 12\cdot N_1\cdot(N_2)^2 - 2\cdot N_2\cdot(N_1)^2 + (N_1)^3\right]}{2\cdot\left[(N_1)^2 + 4\cdot(N_2)^2\right]} - GN = 0$$

Subing 1 for N1

$$\frac{1}{2} - AF = 0 \qquad \frac{1}{2}\cdot\sqrt{1 + 4\cdot(N_2)^2} - FI = 0 \qquad 2\cdot\frac{N_2}{\sqrt{1 + 4\,(N_2)^2}} - DE = 0$$

$$4\cdot\frac{(N_2)^2}{\left[1 + 4\cdot(N_2)^2\right]} - DH = 0 \qquad \frac{-1}{2}\cdot(2\cdot N_2 + 1)\cdot\frac{\left[4\cdot(N_2)^2 + 4\cdot N_2 - 1\right]}{\left[1 + 4\cdot(N_2)^2\right]} - GN = 0$$



060807 C.MCD

Equation for an Ellipse

$N_1 := 3.38667$

$N_2 := 2.05199$

$N_3 := 3.57039$

$N_4 := .94919$

$AB := N_1 \quad AI := N_2 \quad CE := N_3 \quad CD := N_4$

$HI := \sqrt{(AB + AI)\cdot(AB - AI)} \quad GI := \frac{CD \cdot HI}{CE} \quad AG := \sqrt{AI^2 + GI^2}$

$$\frac{N_4 \cdot \sqrt{(N_1 + N_2)\cdot(N_1 - N_2)}}{N_3} - GI = 0$$

$$\frac{1}{N_3} \cdot \sqrt{N_2^2 \cdot N_3^2 + N_4^2 \cdot N_1^2 - N_4^2 \cdot N_2^2} - AG = 0$$

062007c Tangents from the Axis

$m\angle DEF = 52.68254°$

$m\angle FEG = 52.68254°$

$m\angle FEC = 90.00000°$

$KJ = 4.27389$ cm

$JC = 4.16632$ cm

$\sqrt{JC \cdot KJ} = 4.21976$ cm $JL = 4.21976$ cm

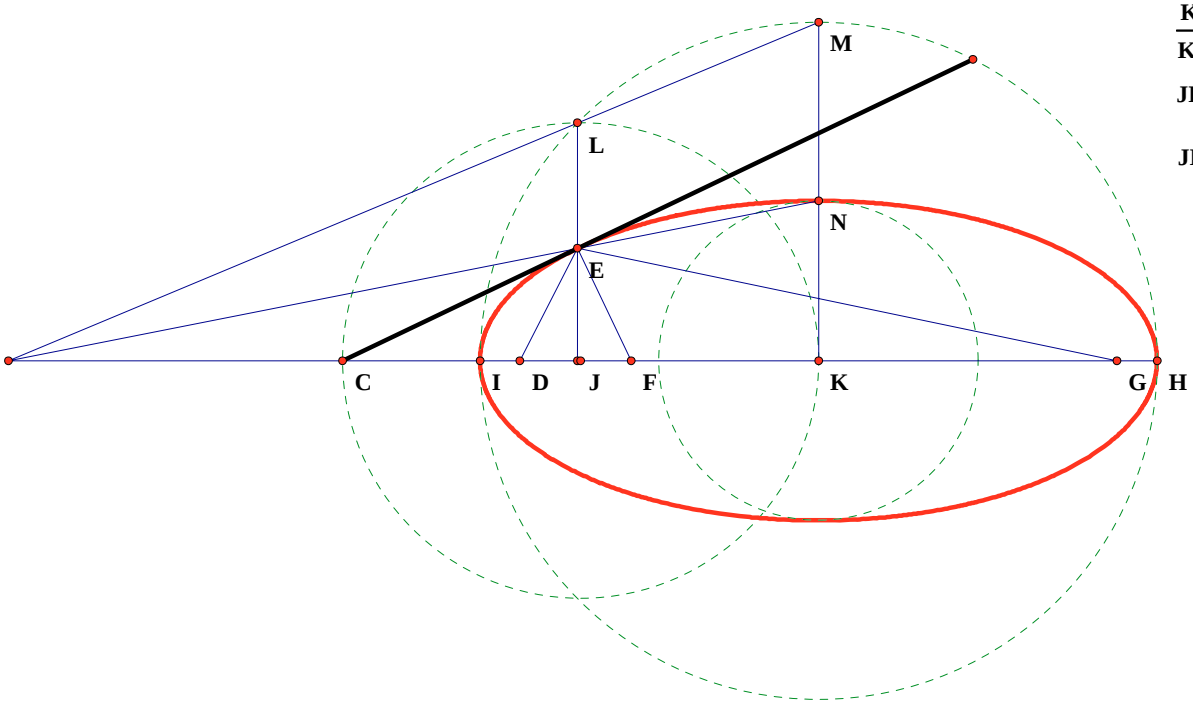
$KM = 6.00604$ cm

$KN = 2.83557$ cm

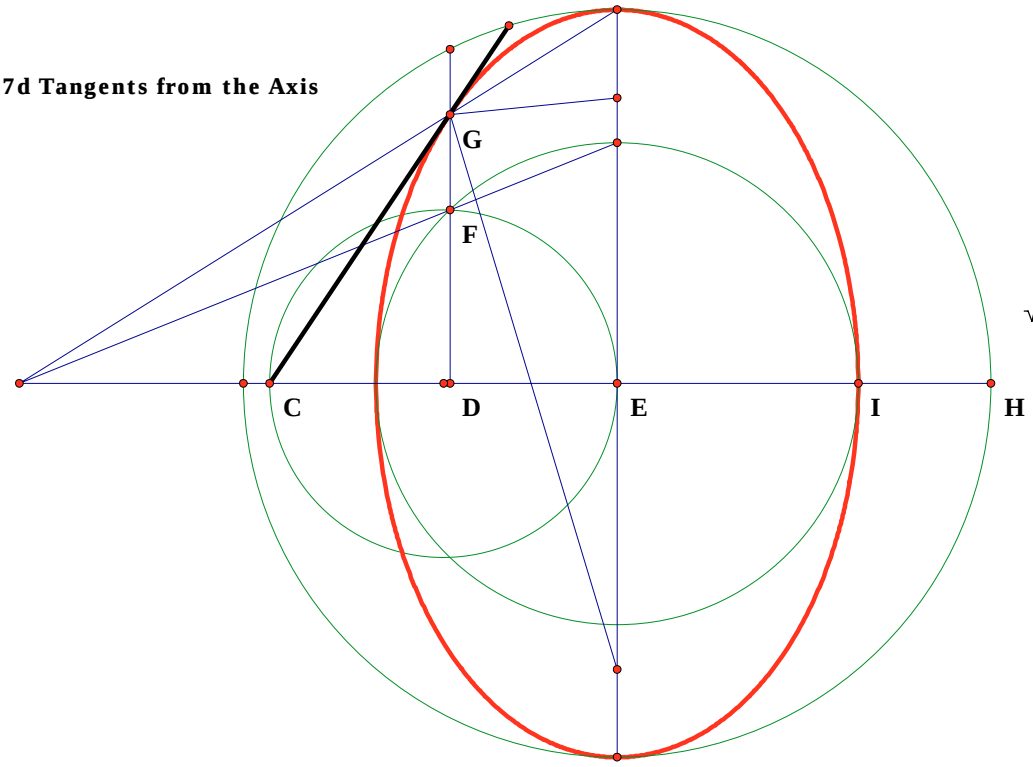
$\frac{KN}{KM} = 0.47212$

$JE = 1.99223$ cm

$JL \cdot \frac{KN}{KM} - JE = 0.00000$ cm



062007d Tangents from the Axis



CD = 2.89445 cm

ED = 2.68826 cm

DF = 2.78945 cm

$\sqrt{CD \cdot ED}$**-DF = 0.00000 cm**

DG = 4.32463 cm

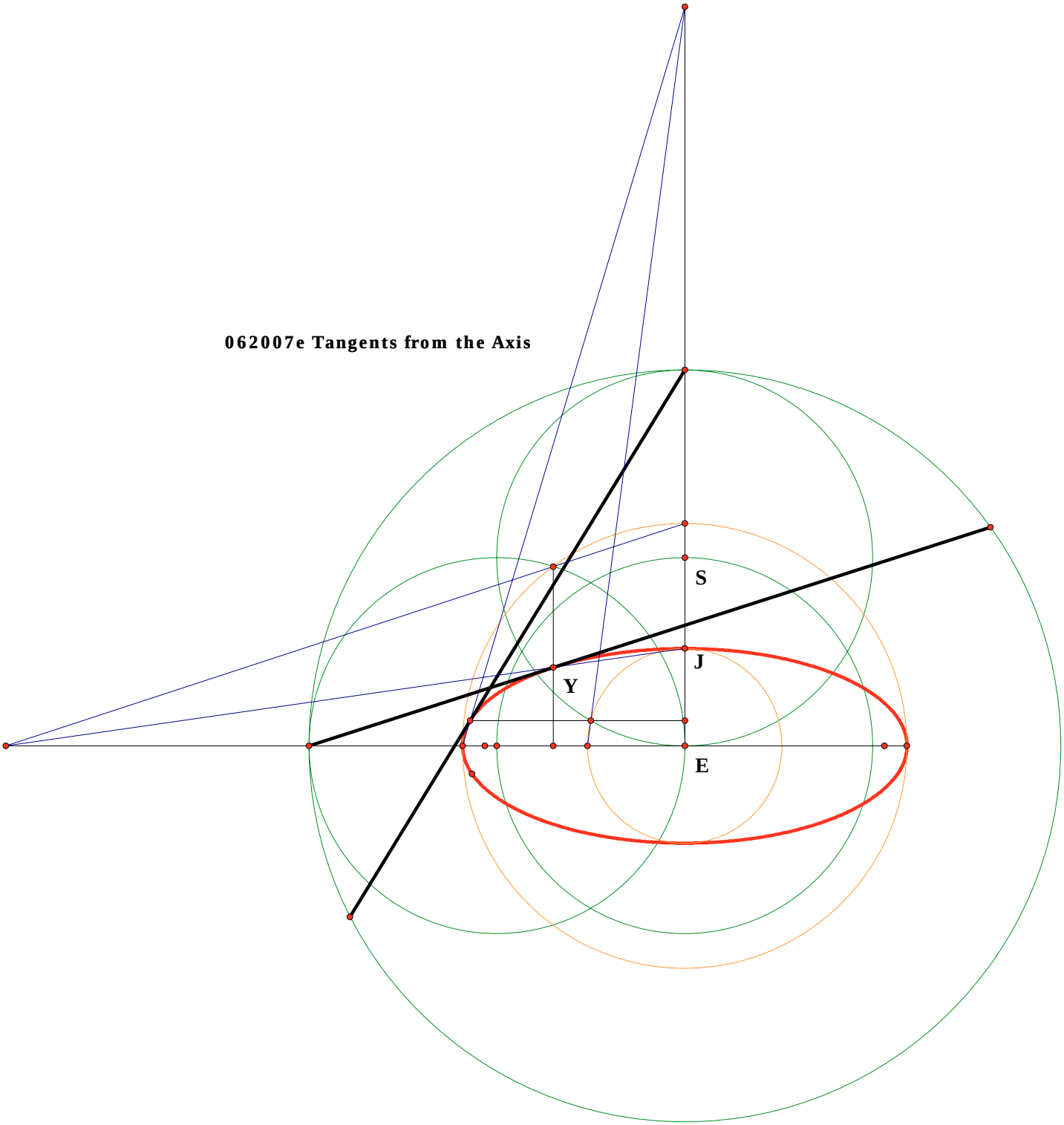
EH = 6.00604 cm

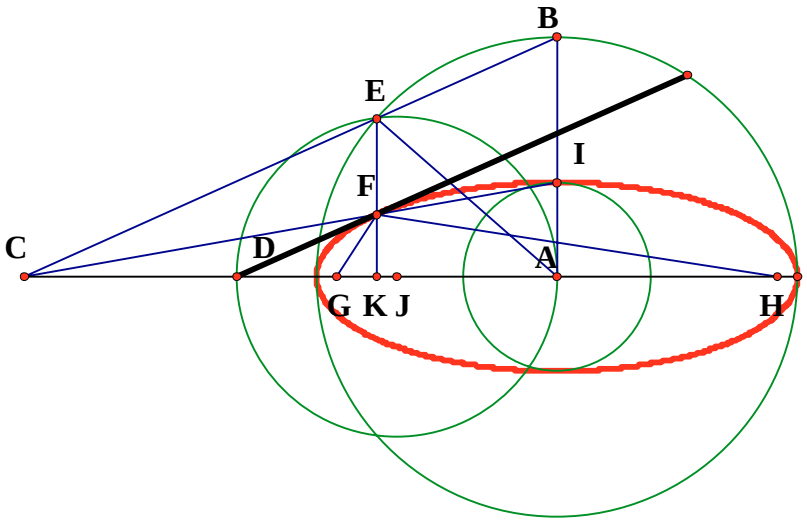
EI = 3.87398 cm

$\frac{EH}{EI}$ **= 1.55035**

$DF \cdot \frac{EH}{EI}$**-DG = 0.00000 cm**

062007e Tangents from the Axis





$N_1 := 3.17500$

$N_2 := 1.24993$

$N_3 := 4.23333$

$AB := N_1$

$AI := N_2$

$AD := N_3$

$AJ := \frac{AD}{2}$ From 080193 $EK := \frac{AB \cdot \sqrt{(2 \cdot AJ - AB) \cdot (2 \cdot AJ + AB)}}{2 \cdot AJ}$

$AK := \sqrt{AB^2 - EK^2}$ $DK := AD - AK$ $FK := \frac{AI \cdot EK}{AB}$ $DF := \sqrt{DK^2 + FK^2}$

$DL := \frac{DF^2}{DK}$ $AG := \sqrt{AB^2 - AI^2}$ $AH := AG$

$HK := AH + AK$ $GK := AG - AK$

$FG := \sqrt{FK^2 + GK^2}$

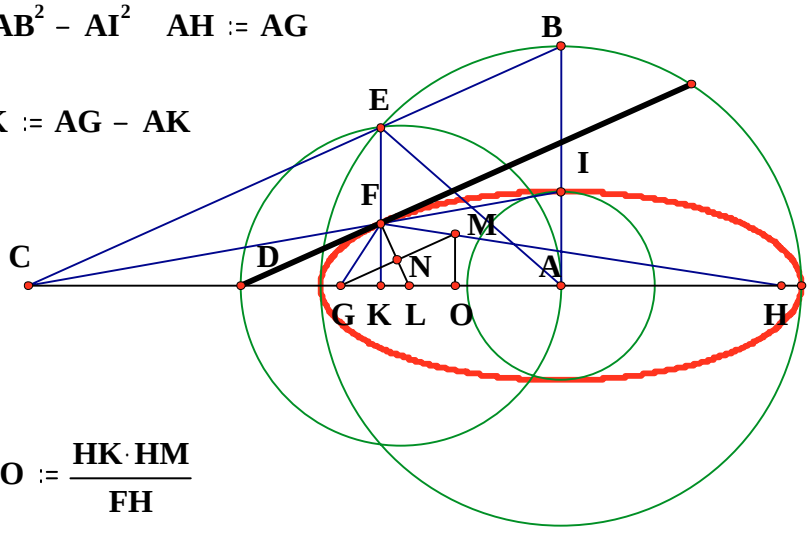
$FM := FG$

$FH := \sqrt{HK^2 + FK^2}$

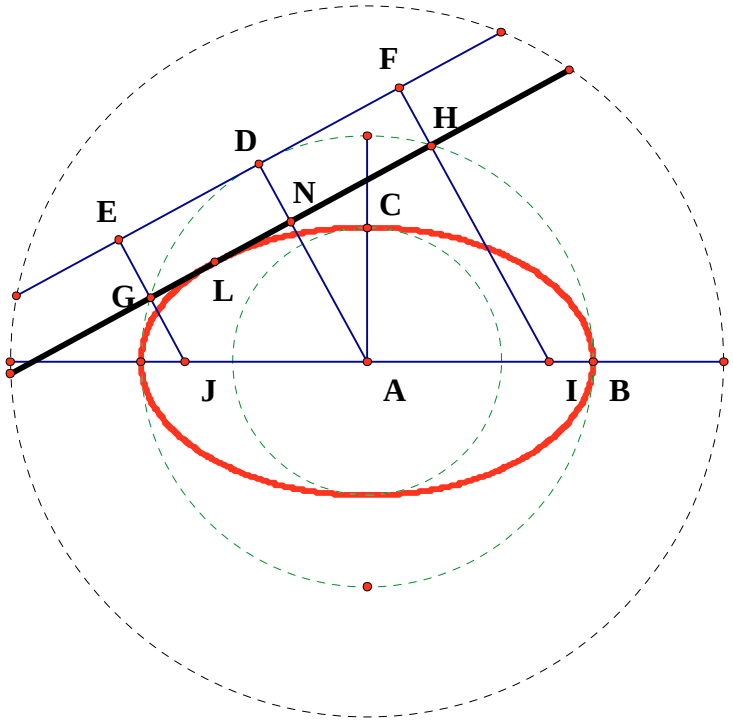
$HM := FH - FM$ $HO := \frac{HK \cdot HM}{FH}$

$GH := 2 \cdot AH$ $GO := GH - HO$

$MO := \frac{FK \cdot HM}{FH}$ $\frac{GO}{MO} - \frac{DK}{FK} = 0$ $N_2 \cdot \frac{\sqrt{(N_3 - N_1) \cdot (N_3 + N_1)}}{N_3} - FK = 0$



Found on the Internet 062407



Found the construction, now I explore it with equations.

$N_1 := 2.98979$

$N_2 := 1.77791$

$N_3 := 1.83972$

$AB := N_1 \quad AC := N_2$

$EJ := N_3$

$AJ := \sqrt{AB^2 - AC^2}$

$FI := (AB - EJ) + AB$

$DE := \sqrt{AJ^2 - (AB - EJ)^2} \qquad AN := \dfrac{\sqrt{DE^2 \cdot (DE + AB) \cdot (-DE + AB)}}{DE}$

$DN := AB - AN \quad GJ := EJ - DN \quad HI := FI - DN \quad GL := \dfrac{GJ \cdot 2 \cdot DE}{GJ + HI}$

$HL := 2 \cdot DE - GL \quad JL := \sqrt{GL^2 + GJ^2} \quad IL := \sqrt{HI^2 + HL^2} \qquad (JL + IL) - 2 \cdot AB = 0$

Algebraic Names

$AJ - \sqrt{N_1^2 - N_2^2} = 0 \qquad FI - \left(2 \cdot N_1 - N_3\right) = 0$

$$DE - \sqrt{-N_2^2 + 2 \cdot N_1 \cdot N_3 - N_3^2} = 0 \qquad \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} - AN = 0$$

$$N_1 - \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} - DN = 0$$

$$N_3 - N_1 + \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} - GJ = 0$$

$$\left(N_1 - N_3 + \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2}\right) - HI = 0$$

$$\left(N_3 - N_1 + \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2}\right) \cdot \frac{\sqrt{-N_2^2 + 2 \cdot N_1 \cdot N_3 - N_3^2}}{\sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2}} - GL = 0$$

$$\sqrt{-N_2^2 + 2 \cdot N_1 \cdot N_3 - N_3^2} \cdot \frac{\left(\sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} - N_3 + N_1\right)}{\sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2}} - HL = 0$$

$$N_1 \cdot \sqrt{\frac{\left[\left[\left(2 \cdot N_3 \cdot \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} - 4 \cdot N_1 \cdot N_3\right) \ldots\right] \ldots + 2 \cdot N_3^2 + N_2^2 + 2 \cdot N_1^2\right] + -2 \cdot N_1 \cdot \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2}}{\left(N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2\right)}} - JL = 0$$

$$N_1 \cdot \sqrt{\frac{\left(2 \cdot N_1^2 - 4 \cdot N_1 \cdot N_3 + 2 \cdot N_3^2 - 2 \cdot N_3 \cdot \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} \ldots + 2 \cdot N_1 \cdot \sqrt{N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2} + N_2^2\right)}{\left(N_1^2 + N_2^2 - 2 \cdot N_1 \cdot N_3 + N_3^2\right)}} - IL = 0$$